



United States
Department of
Agriculture

Forest
Service

November 2017



Botanical Resources and Non-native Invasive Species Report

Lover's Canyon Project

**Salmon/Scott River Ranger District, Klamath National Forest
Siskiyou County, California**

For Information Contact: Danika Carlson
11263 N. Hwy 3, Fort Jones, CA
530.468.1225
Dcarlson02@fs.fed.us

Non-Discrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the bases of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, or all or part of an individual's income is derived from any public assistance program, or protected genetic information in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases will apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (PDF) within 45 days of the date of the alleged discriminatory act, event, or in the case of a personnel action. Additional information can be found online at www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form (PDF), found online at www.ascr.usda.gov/complaint_filing_cust.html, or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter to us by mail at U.S. Department of Agriculture, Director, Office of Adjudication, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, by fax (202) 690-7442 or email at program.intake@usda.gov.

Persons with Disabilities

Individuals who are deaf, hard of hearing or have speech disabilities and you wish to file either an EEO or program complaint please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

Persons with disabilities who wish to file a program complaint, please see information above on how to contact us by mail directly or by email. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.) please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Table of Contents

Biological Assessment.....	3
Introduction.....	3
Proposed Action and Alternatives Analyzed	3
Current Policy and Management Direction	4
Methodology	4
Affected Environment.....	5
Environmental Consequences	5
Biological Evaluation	5
Introduction.....	5
Methodology	6
Affected Environment.....	10
Species Accounts	11
Environmental Consequences	16
Non-Native Invasive Plant Species Risk Assessment Report	23
Introduction.....	23
Methodology	24
Affected Environment.....	26
Environmental Consequences	29
Botanical Review of Survey and Manage Plant Species	33
Introduction.....	33
Methodology	34
Affected Environment.....	36
Environmental Consequences	38
Literature Cited.....	41
Appendix A– Klamath Sensitive Plant Species List.....	44
Appendix B– Klamath National Forest Noxious Weed List	46

List of Tables

Table 1 below shows the summary of effects to the analysis indicator for Threatened, Endangered, Proposed, and Candidate plant species.	5
Table 1: Summary of Effects to Threatened, Endangered, Proposed, and Candidate Plant Species	5
Table 2. Documented occurrences or suitable habitat for Sensitive species.....	6
Table 3. Likelihood of Effects to Plant Species of Concern. The number in [brackets] is the weight the factor has in the likelihood equation. The number in (parenthesis) is the value input into the equation to determine likelihood as described below.	8
Table 4. Results of field review and survey of the Project area.....	11
Table 6. Results of Likelihood of Effects analysis to Sensitive plant species for the No Action Alternative.	17
Table 7. Likelihood of Effects to Plant Species of Concern for Alternatives 2 & 3	18
Table 8: Summary of Effects to Sensitive Fungi Species of Concern	21
Table 9. Risk Assessment by Factor	25
Table 10: Summary of risk of spreading and/or introducing Noxious Weeds.....	32
Table 11. Survey and Manage Species Present or Requiring Pre-Disturbance Survey in the Project Area.....	35
Table 12. Survey and Manage Survey Results	36
Table 13: Summary of compliance to Survey and Manage Species	39

This report includes the Biological Assessment/Evaluation for Threatened, Endangered, Proposed, and Candidate plant species, the Biological Evaluation for Forest Service Sensitive Plant Species; Noxious Weed Risk Assessment and the Botanical Review of Survey and Manage Plant Species.

Biological Assessment

Introduction

The purpose of this section is to evaluate the Lover's Canyon Project in sufficient detail to determine its effects on Threatened, Endangered, or Proposed plant species. This Biological Assessment (BA) is prepared in accordance with the legal requirements set forth under Section 7 of the Endangered Species Act [19 U.S.C. 1536 (c)], and follows the standards established in the Forest Service Manual direction (FSM 2672.42).

Proposed Action and Alternatives Analyzed

The Salmon/Scott River Ranger District of the Klamath National Forest proposes the Lover's Canyon Project to manage the Lover's Canyon Project landscape so that individual landscape elements and patterns are resilient to ecological processes occurring on the landscape scale, including wildfire, while managing for certain habitat characteristics, such as those for the northern spotted owl, visual objectives, and sustainable resource outputs. The Forest Service proposes this project to meet the purpose and need:

- A. No Action Alternative – Under the No Action Alternative the activities proposed in the proposed action and Alternative 3 would not be implemented.
- B. Alternative 2 (Proposed Action) - Acres by treatment type for Alternative 2 are described in detail in the Scoping Outcome Summary for the Lover's Canyon Project. Treatments would include thinning, creating fuel breaks, removal of hazard trees, and prescribed burning.
- C. Alternative 3 – Acres by treatment type for Alternative 3 are described in detail in the Scoping Outcome Summary for the Lover's Canyon Project. Treatments would include thinning with prescriptions for maintaining northern spotted owl habitat, creating fuel breaks, removal of hazard trees, and prescribed burning, with prescriptions modified for maintenance of high value northern spotted owl habitat.

Project design features designed to protect botanical species of concern and prevent the introduction and/or spread of non-native invasive plant species will be incorporated into action alternatives. The botanical resources project design features can be found in the Lover's Canyon Environmental Assessment.

The legal description is:

Township (T) 44 North (N) Range (R) 12 West (W), Sections 25 and 36; T44N R11W, Sections 19, 21, and 25-35; T43N R12W, Section 1; T43N R11W, Sections 2-8 all Mt. Diablo Meridian. Elevation ranges from about 2,300 to 6,900 feet.

Current Policy and Management Direction

Section 7 of the Endangered Species Act of 1973, as amended, and Forest Service Policy (FSM 2670) direct Federal agencies to ensure that any action authorized, funded, or permitted by such agencies is not likely to jeopardize the continued existence of species listed, or proposed to be listed as Endangered or Threatened by the U.S. Fish and Wildlife Service (USDA 2005a).

Methodology

The likelihood that the continued existence of Threatened, Endangered, Proposed, or Candidate plant populations will be jeopardized by this project will be evaluated by determining the number of existing populations within the project boundary and the number and degree to which those populations will be negatively affected by the proposed action.

Threatened, Endangered, Proposed, and Candidate

A list of species was obtained from the Arcata Field Office, U.S. Fish and Wildlife Service website for the Klamath National Forest, on 11/14/2016 (Document #QHY7A-Y7Q6J-GFPEH-I632F-U4VOXA).

Scientific Name	Common Name	Category
<i>Arabis macdonaldiana</i>	McDonald's rock-cress	E
<i>Astragalus applegatei</i>	Applegate's milk-vetch	E
<i>Chamaesyce hooveri</i>	Hoover's Spurge	T
<i>Fritillaria gentneri</i>	Gentner's fritillary	E
<i>Phlox hirsuta</i>	Yreka phlox	E
<i>Orcuttia tenuis</i>	Slender Orcutt Grass	T
<i>Tuctoria greenei</i>	Greene's Tuctoria	E

The Lover's Canyon Project is not within range or within habitat of *Arabis macdonaldiana*, *Astragalus applegatei*, *Chamaesyce hooveri*, *Fritillaria gentneri*, *Phlox hirsuta*, *Orcuttia tenuis*, or *Tuctoria greenei*.

A pre-field and preliminary field review determined that this project is not within the range or habitat of any federally listed plant species that is Threatened, Endangered, or Proposed (TEP) for federal listing (see Appendix A). Field surveys conducted for the Lover's Canyon Project were adequate to determine presence of TEP plant species.

The analysis indicators for measuring the effects of the Lover's Canyon Project are based on law, policy and direction. The Analysis indicator is the presence of Threatened, Endangered, Proposed, or Candidate Plant Species within the Project area.

Spatial and Temporal Bounding of Analysis Area

The project area is the analysis area as this is the extent to which effects to Threatened, Endangered, or Proposed plant species would be observed as a result of project activities. The Lover's Canyon Project is not within range and/or habitat and there are no known populations of any federally listed species therefore temporal bounding of the analysis is not necessary.

Affected Environment

Environmental Consequences

No populations of these federally listed Threatened, Endangered, Proposed, or Candidate plant species have been recorded in botanical records or identified in previous surveys within the Lover's Canyon Project area. No critical habitat is established for these species in the project area. In addition, no federally listed plant species were found during the field surveys for this project. Therefore, there will be no direct, indirect or cumulative effects to these species. Additionally, there are no activities that are interrelated or interdependent to the proposed action that will affect these species.

Consultation to Date: No consultation required

Determination of Effects

It is my determination that the Lover's Canyon Project will not affect *Arabis macdonaldiana*, *Astragalus applegatei*, *Chamaesyce hooveri*, *Fritillaria gentneri*, *Phlox hirsuta*, *Orcuttia tenuis*, or *Tuctoria greenii*.

Table 1 below shows the summary of effects to the analysis indicator for Threatened, Endangered, Proposed, and Candidate plant species.

Table 1: Summary of Effects to Threatened, Endangered, Proposed, and Candidate Plant Species

Indicator	Alternative 1	Alternatives 2 & 3
Presence of Threatened, Endangered, Proposed, or Candidate Plant Species	No Affect	No Affect

Compliance with law, regulation, policy, and the Forest Plan

The Lover's Canyon Project complies with Section 7 of the Endangered Species Act of 1973, as amended, and Forest Service Policy (FSM 2670).

Biological Evaluation

Introduction

The purpose of this section is to evaluate the Lover's Canyon Project in sufficient detail to determine its effects on Sensitive plant species. This Biological Evaluation (BE) is prepared in accordance with the legal requirements set forth under Section 7 of the Endangered Species Act [19 U.S.C. 1536 (c)], and follows standards established in the Forest Service Manual direction (FSM 2672.42).

The Region 5 Regional Forester has listed plants for which there is a concern for species viability as Sensitive. Sensitive plants are those species which may occur in few to large numbers in a small localized area, or which may occur in a wide geographical area but in few numbers in restricted specialized habitats. Forty seven Sensitive plants species are known, or thought likely to occur on the Klamath National Forest (USDA 2013a). This BE addresses this list.

Current Policy and Management Direction

Section 7 of the Endangered Species Act of 1973 as amended, and Forest Service Policy (FSM 2670) direct Federal agencies to ensure that any action authorized, funded, or permitted by such agencies is not likely to jeopardize the continued existence of species listed as Sensitive by the Region 5 Regional Forester, or to cause a trend to federal listing for species listed as Sensitive (USDA 2005a).

Forest-wide Standards and Guidelines have been developed that direct the management of Sensitive plants species to ensure the maintenance of reproducing, self-sustaining populations, and to prevent the need for the species to become listed as threatened and endangered species (USDA 1995). The Standards and Guidelines can be found in the Forest Plan Consistency Checklist that was developed for this project.

Methodology

Only Sensitive species that are within range and have potentially suitable habitat, or documented occurrences in areas that may be affected by the proposed project are discussed in this document. These areas include all activities discussed in the proposed action. The following preliminary botanical review was done to determine which species are a concern.

Preliminary Botanical Review

An office pre-field analysis and a preliminary field review were conducted to determine if this project is within the range of any Klamath listed Sensitive plant species, and if suitable habitat is present within the proposed project area (USDA 2013b, Appendix A). All Sensitive plant species listed for the Klamath National Forest were considered during this review (USDA 2013a). Surveys are not required for species for which suitable habitat is not present, and for which the project area is outside of the currently known range of the species. The pre-field analysis includes a comparison of the range and habitat necessary for each species on the list to the location and habitat that is present within the project area. The preliminary field review is conducted to assess areas of assumed habitat and determine if suitable habitat is actually present in the project area that would warrant further survey. After the pre-field analysis and preliminary field review was completed, unit specific project surveys were conducted for the species that are within range and have suitable habitat in the project area. During unit specific surveys the habitat could be re-assessed and species could be added to the target list if habitats are found that were previously thought not to occur within a project area.

The proposed project area was determined to contain documented occurrences or suitable habitat for the following species listed in Table 2:

Table 2. Documented occurrences or suitable habitat for Sensitive species

SPECIES	CODE	STATUS	FIELD SURVEY RECOMMENDED
<u>Known Occurrences</u>			
<i>Cypripedium montanum</i>	CYMO2	Sensitive/Survey & Manage - Vascular	Yes
<u>Suitable Habitat</u>			
<i>Botrychium pinnatum</i>	BOPI	Sensitive - Vascular	Yes
<i>Cypripedium fasciculatum</i>	CYFA	Sensitive/Survey & Manage – Vascular	Yes
<i>Erythronium hendersonii</i>	ERHI7	Sensitive - Vascular	Yes

SPECIES	CODE	STATUS	FIELD SURVEY RECOMMENDED
<i>Buxbaumia viridis</i>	BUVI	Sensitive/Survey & Manage - Bryophyte	Yes
<i>Mielichhoferia elongata</i>	MIEL5	Sensitive – Bryophyte	Yes
<i>Boletus pulcherrimus</i>	BOPU4	Sensitive/Survey & Manage – Fungi	No
<i>Cudonia monticola</i>	CUMO2	Sensitive/Survey & Manage – Fungi	No
<i>Dendrocollybia racemosa</i>	DERA5	Sensitive/Survey & Manage – Fungi	No
<i>Phaeocollybia olivacea</i>	PHOL	Sensitive/Survey & Manage – Fungi	No
<i>Peltigera gowardii</i>	PEGO	Sensitive – Lichen	Yes

Sensitive Fungi: An evaluation of effects to species listed for which surveys were not recommended is included in this document.

Cypripedium montanum is listed on both the Region 5 Sensitive Species list and the Survey & Manage species list. Survey & Manage guidelines will be used to analyze effects to *Cypripedium montanum* because they provide for a more protective management strategy. For the analysis of effects to this species see the Survey & Manage Botanical Review below, this species will not be addressed further in this Biological Evaluation.

Field Survey

Potential rare plant habitat was assessed using the Order 3 Soil Survey of the Klamath National Forest, GIS records, the Klamath NF GIS database, population records, the California Natural Diversity Database (CNDDB), personal field visits, and past field visits in the project area. Project specific surveys were conducted in April, May, June, and July of 2012 and June, July, and August of 2013. These surveys were in addition to past field work for other projects that also located Sensitive plants. All field surveys were performed at a time appropriate to make positive identifications of Sensitive plant species of concern. Surveys were intuitively controlled; only project activity areas with suitable habitat were surveyed for the target species (CYMO2, CYFA, BOPI, ERHI7, BUVI, MEIL5, and PEGO). Previously documented populations of *Cypripedium montanum* were relocated during project specific surveys.

Sensitive Plant Survey Reports dated April, May, June, and July of 2012; and June, July, and August of 2013. The Sensitive Plant Population Reports are coded as CYMO2-5-60 and CYMO2-5-8. No field survey for the Sensitive fungi BOPU4, CUMO2, DERA5, or PHOL were performed. Presence for the Sensitive fungi is assumed based on species-habitat associations, presence of suitable or potential habitat, and a review of the literature on the effects to the fungi species of concern. This information is used to determine potential effects on Sensitive fungi species.

Analysis Indicators

The analysis indicators for measuring the effects of the Lover's Canyon Project are based on law, policy, and direction. The significance of management activities upon plant species viability depends upon many factors, including the size of known populations, the wider geographic range of known plant populations outside of the project area, and the degree of species sensitivity to short-term and long-term habitat modification. The alternatives are evaluated in terms of how they would affect plant species viability in the context of the above factors. The alternatives are compared using the following indicators:

- The likelihood that project activities would cause a change in population viability to Sensitive Plant Species within the analysis area.
- The likelihood that effects at the project scale would potentially cause a change in population viability that would lead towards a trend to federal listing or loss of species viability across its range.

Measures

In order to measure the effects to the above analysis indicators the following likelihood assessment will be completed for each alternative within the bounds of the analysis area as defined.

Spatial and Temporal Bounding of Analysis Area

Management activities and their effects on sensitive plants can be both long-term and short-term. Activities that occur once on a specific population may not affect a population or its habitat if the species possesses the biological mechanisms to recover, while repeated activities may have the potential to significantly impact a population.

The spatial boundary is the project area boundary, any activities occurring outside of this boundary would not impact individual populations within this project area and would not cause cumulative impacts related to this project. Short-term effects are those that occur at the time of implementation and up to three years thereafter. Long-term effects may occur more than three years after implementation.

Likelihood Assessment

This assessment was developed to standardize the process for determining the likelihood that effects to Sensitive plant species will result in a decrease in population viability within the analysis area.

The likelihood that effects to Sensitive plant species will result in a decrease in population viability is evaluated using four factors. The first two factors establish the baseline habitat presence or condition. The other two factors are used to estimate the effects of the project on the species which will then be added to the baseline for each alternative to show the differences in effects. Details are in Table 3.

- Known populations of Sensitive species within the analysis area (Affected Environment)
- Existing habitat condition of the analysis area (Affected Environment)
- Expected habitat alterations (direct effects, short-term) as a result of project activities
- Expected habitat condition post project implementation (indirect effects, long-term)

Table 3. Likelihood of Effects to Plant Species of Concern. The number in [brackets] is the weight the factor has in the likelihood equation. The number in (parenthesis) is the value input into the equation to determine likelihood as described below.

Factors	Components	Variations	Likelihood of Affects
---------	------------	------------	-----------------------

Factors	Components	Variations	Likelihood of Affects
1. Known Populations (Affected Environment) [x1]	<i>Which species, and how many populations occur.</i>	<p>None Present (w/in project boundary) →</p> <p>Present within analysis area but not within proposed treatment (consider connected actions and indirect effects) →</p> <p>Present, w/in activity units and connected actions →</p>	<p>None – No Affect (0)</p> <p>Low (1)</p> <p>Moderate (2)</p>
2. Habitat Condition (Affected Environment, pre-project) [x1]	<i>Basic habitat requirements for the species.</i>	<p>Habitat is currently adequate and providing necessary components, habitat is very specific and fragile to change →</p> <p>Habitat is currently adequate and providing necessary components, habitat is somewhat general and may recover from change →</p> <p>Habitat is at risk or barely providing necessary components (further explanation below) →</p> <p>Not functioning (ex. Burned) →</p>	<p>High (3)</p> <p>Moderate (2)</p> <p>Moderate (2)</p> <p>Low or None (1)</p>
3. Habitat Alteration Expected as a Result of Action Alternatives [x2]	<i>Specific PDFs or habitat protection provided by other mitigation like the AQCS or what disturbances are going to take place within habitat.</i>	<p>Complete Avoidance, no alteration w/in population or contributing habitat components. →</p> <p>Minimal disturbance, disturbance will be implemented with the purpose of maintaining/improving habitat components specific to plant species. →</p> <p>Disturbance to plant habitat will be moderate, basic habitat requirements will be maintained, but at lower levels than currently exist. →</p> <p>Disturbance to plant habitat will be high, basic habitat components that are required may not be maintained at a level that would support continued viability. →</p>	<p>Low (1)</p> <p>Moderate/Low (2)</p> <p>Moderate/High (3)</p> <p>High (4)</p>

Factors	Components	Variations	Likelihood of Affects
4. Habitat Condition After Project Implementation (Indirect Effects) [x2]	<i>Think longer term here, if there was disturbance during implementation will the habitat be in better shape long term? Will it be the same or worse?</i>	Habitat adequate and providing necessary components →	Low (1)
		Habitat at risk or barely providing necessary components (further explanation below) →	Moderate (2)
		Not functioning →	High (3)

The likelihood that effects to Sensitive species will result in decreased population viability with the proposed activities are generally described as low, moderate, or high. Factors are assigned weighted scores (in brackets in Table 3) based on their importance in determining the likelihood of affects. Additionally, each value is assigned a score, and the combination of the weight of the factor and each value score is used to calculate an overall likelihood score. The equation used to estimate likelihood is:

$$\text{Likelihood Score} = \text{Factor 1} + \text{Factor 2} + (2 \times \text{Factor 3}) + (2 \times \text{Factor 4})$$

The results of the Likelihood Score are interpreted below:

- *None (Likelihood Score = 0)* = no measurable effect on existing Sensitive species populations or suitable habitat. If the first factor has a score of zero, all other factors are irrelevant, because of this, 5 is the next lowest score possible after a score of zero.
- *Low (Likelihood Score = 5-10)* = existing Sensitive species populations and/or suitable habitat not likely affected
- *Moderate (Likelihood Score = 11-15)* = existing Sensitive species populations and/or suitable habitat affected: project activities will affect individuals or small populations but this may not necessarily result in a loss of population viability or a trend towards Federal listing. This score could indicate a short term impact that would result in long term habitat improvement, if this is the case more discussion would follow in the environmental consequences section.
- *High (Likelihood Score = 16-20)* = Sensitive species populations and/or suitable habitat affected, population viability within the analysis area is at risk; additionally, a score of 19 or 20 indicates that project activities could result in a trend towards Federal listing.

Affected Environment

As a result of project specific surveys, no additional sites of any Sensitive plant species were located. Previously known sites of *Cypripedium montanum* (covered under the Survey and Manage Review below) were relocated during project survey, however these sites are not located in any of the treatment units. Table 4 shows the results of project specific survey for Sensitive plants. Field surveys conducted for the Lover's Canyon Project were adequate to determine presence of TES plant species. An evaluation of effects to the fungi species listed for which surveys were not recommended is included in this document.

Table 4. Results of field review and survey of the Project area

SPECIES	POPULATION NUMBER(S)
Known to occur in Project Area:	
<i>Cyripedium montanum</i>	CYMO2-5-60 and CYMO2-5-8
Assumed to occur based on Habitat Evaluation:	
<i>Boletus pulcherrimus</i> <i>Cudonia monticola</i> <i>Dendrocollybia racemosa</i> <i>Phaeocollybia olivacea</i>	

Species Accounts

The following species accounts describe the Sensitive plants that are either known to occur or for which a habitat evaluation is occurring within the project area. Included in each species account is the current habitat condition within the project area compared to the desired condition for the species. The effects to *Cyripedium montanum* can be found in the Survey and Manage Botanical Review section of this report.

There is very little specific information available about the Sensitive fungi species. The following species accounts are based on the best available information. The majority of the information has come from the *Handbook to Additional Fungal Species of Special Concern in the Northwest Forest Plan* (USDA 2003), *Handbook to Strategy 1 Fungal Species in the Northwest Forest Plan* (USDA 1999b), and *Management Recommendations for Survey and Manage Fungi* (USDA 1997b). In addition, this analysis is based upon a database query of the results of the pre-project surveys, strategic surveys, and purposive surveys that have been completed within Oregon, Washington, and California, and on the species range listed in the scientific literature. There have been surveys for fungi species of concern conducted within the most suitable areas of the project, and no species were located, however, because it was not feasible to conduct further fungi surveys a habitat analysis is being conducted for the potential effects of this project. Based on survey that has been completed, and the habitat that occurs within the project area it is determined that there is an overall low probability that these species actually occur within the project area. The suitable habitat for these species in the Lover's Canyon Project area is located primarily on north facing riparian areas adjacent to perennial streams in mature timber stands.

Mycorrhizal fungi species:

Many fungi taxa are ectomycorrhizal (ECM) formers. Mycorrhizae are the symbiotic, mutually beneficial association between a fungus and plant root. This highly interdependent relationship is based on the translocation of mineral nutrients and water by the fungus to the host plant while the fungus obtains photosynthetic carbon from the host plant. Nutrients are transported through an underground network called mycelia. Mycelia can extend over several acres. Some mycorrhizal associations are highly specific, and some fungi are dependent upon specific vascular plant species as hosts. Many plants depend upon mycorrhizal fungi for adequate uptake of nutrients and survival. Likewise mycorrhizal fungi depend upon their host plant for carbohydrates. No specific information is available for any of these taxa at this time.

These fungi are dependent upon the habitat elements that support the species and their vascular plant hosts throughout their life cycles. Adequate overstory, understory, and shrub layers of diverse species are required to support these species. Overstory tree cover is important to maintain high moisture levels within the forest litter and large woody debris.

- *Boletus pulcherrimus* – Alice Eastwood's Bolete – BOPU4:

This mycorrhizal species is endemic to the Pacific Northwest in Washington, Oregon, and northern California. There are known sites on the Ashland District of the Rogue River National Forest and the Ashland Resource Area of the Medford BLM, which are northeast of the project area. There is one known site on the Klamath NF on the Ukonom Ranger District. This species is found in humus in association with the roots of mixed conifers and hardwoods (primarily *Abies grandis*, *Pseudotsuga menziesii*, and, *Lithocarpus densiflorus*) in older coastal forests. Of these, only *Pseudotsuga menziesii* is present within the project area. It is unknown if these are the only tree species that this fungus forms an association with. BOPU4 is a large epigeous mushroom that presumably needs moisture to fruit during late summer or early autumn (USDA 1997b). Because the majority of the known sites of this species are located in more humid or coastal locations and in older forests, the project area may be too dry (and too young) to support this species. There is a low potential that the species may be present within the project area. If present, populations are most likely to occur on wet, north facing slopes or in riparian areas with a perennial stream.

- *Phaeocollybia olivacea* – olive Phaeocollybia – PHOL:

This species is endemic to the western United States from the central Washington coast south to Santa Cruz County. Within the range of the northern spotted owl, populations are known from the western portions of Washington, Oregon, and California as far south as the Mendocino National Forest. There are multiple known sites on the Klamath National Forest, but none are known to occur within the project area. PHOL has been found scattered in older mixed forests containing oak, pine, true fir, tanbark oak, or sequoia in western mountain ranges. There is a potential that this species may be present within the project area. If present, populations are most likely to occur on wet, north facing slopes or in riparian areas with a perennial stream.

Saprophytic fungi species:

Saprophytic species obtain nutrients by the decomposition of dead organic matter. These fungi species are dependent upon adequate amounts of leaves, needles, limbs, large woody debris, other decomposing forest litter, or even dead animal carcasses to provide a substrate and to supply a continuous source of nutrients. These species are not dependent upon specific vascular plant hosts, but may require adequate canopy coverage to retain moisture levels sufficient to support them. Most of the known sites of these species are located on the west side of the Klamath NF where climatic conditions provide higher levels of rainfall than that which is found in the central and eastern portions of the Klamath.

- *Cudonia monticola* – CUMO2:

This very rare saprophytic species is endemic to western North America. Within the range of the northern spotted owl, populations are known from the western portions of Washington, Oregon, and northern California. There are no database records of known

sites on adjacent National Forests lands or BLM districts. No sites were discovered during strategic surveys conducted on the Klamath NF. Two populations of this species were previously known on the Klamath NF, on the Ukonom Ranger District. This species is found on coniferous needles and debris within older forests. The Handbook lists this species as occurring on *Picea* (spruce) needles and coniferous debris, but it is not known if this is the only forest type in which *Cudonia* is found. Spruce is not present within the project area. It has also been found with white fir, Douglas-fir, and pine. There is a low potential for the species to occur within the project area. If present, populations are most likely to occur on wet, north facing slopes or in riparian areas with a perennial stream.

- *Dendrocollybia racemosa* – DERA5:

This saprophytic species is widespread in the Northern Hemisphere but always locally rare. Within the range of the northern spotted owl, populations are known from the western portions of Washington, Oregon, and northern California. There are known sites on the Rogue River NF, and the Shasta-Trinity NF. No sites were discovered during strategic surveys conducted on the Klamath NF, there is one previously documented site of this species on the Scott River Ranger District of the Klamath National Forest. This species is found on rotting or mummified remnants of agarics (fruiting bodies of the mushroom genus *Agaricus*), or occasionally in nutrient-rich leaf mulch in forests. The species has been found in older forests of coast live oak, Douglas-fir, and tanbark oak, along riparian areas, and in other types of conifer forests. There is a potential for the species to occur within the project area. If present, populations are most likely to occur on wet, north facing slopes, or in riparian areas with a perennial stream.

Interactions Important to Analysis

Existing project design features/best management practices designed to protect fish and water resources are likely to provide benefits to the Sensitive fungi species as well. The majority of the habitat for the Sensitive fungi occurs within the riparian areas. Project activities would be limited within Riparian Areas and would only be implemented if they improve the objectives established in the Aquatic Conservation Strategy. The objectives of these protection buffers are to maintain adequate shade and moisture levels, litter, duff, and coarse woody debris components, and species composition. Retention of these components within the buffers would provide continued high quality habitat for the Sensitive fungi species.

- Soil productivity standards from the Klamath National Forest Land and Resource Management Plan (Forest Plan) will be used to conserve surface organic matter and large woody material (USDA 1995) to maintain Sensitive fungi habitat components (See Project Design Features in the Lover's Canyon Environmental Assessment).
- The Klamath Forest Plan Standards and Guidelines for woody material retention will be followed (See Project Design Features in the Lover's Canyon Environmental Assessment), which will help to maintain Sensitive fungi habitat components.
- The Aquatic Conservation Strategy/Riparian Reserve Objectives requires that Silvicultural practices for riparian reserves are designed to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics including species diversity needed to attain Aquatic Conservation Objectives.

There is no species specific information available for the four fungi species that may be present within the project area. General information is available, however, for the two major groups of fungi (mycorrhizal and saprophytic). Fungi differ from vascular plants (flowering plants) in several important ways that affect their response to management activities. Fungi do not have roots, but rather depend upon an extensive network of fungal mycelium to support the organism. Mycelia are fine, net-like structures that penetrate the soil, rotting wood, duff, or other substrates. Mycelia that penetrate the roots of vascular plants form Mycorrhizae. The fruiting structure of a fungus can form anywhere along the network of mycelia. When the substrate within which the mycelial network occurs is disturbed, the fungus is not necessarily killed. Rather, the network would be broken into many fragmented parts that would continue to live and fruit as long as a nutrient source and a moisture source persist. Specifically this means that ground disturbance from logging and fuels treatments, and changes in moisture levels from canopy removal (direct effect), would not necessarily kill fungi populations unless critical habitat elements are removed to an extent that the habitat can no longer support the fungi species (indirect effect).

Mycorrhizal fungi species: The following effects analysis is based primarily upon references provided in a literature review conducted by Lisa Hoover, Forest Botanist, Six Rivers National Forest (Hoover 2004). There is little information available about species-specific effects, but information has been gathered about the effect of management actions upon ectomycorrhizal (ECM) fungi in general. While not eliminating potential effects to target fungal taxa, it is assumed that by managing for habitat elements, adverse effects on communities supporting any one of the target fungi would be reduced.

Boletus pulcherrimus, *Phaeocollybia olivacea*:

Timber harvest effects: Studies that have collected data on the effects of logging on ECM fungi have determined that the effects are closely related to the number of trees that are removed, and the size of canopy gaps that are created. ECM fungi decrease exponentially as gap size increased (Hagerman, et al. 1999). In some studies, effects were seen in openings as small as 45 feet in diameter (Durall, et al. 1999) and in other studies, significant effects were not seen until openings reached 30-tree cluster sizes (260 sqm) (Parsons, et al. 1994). Thinning harvest prescriptions that retained living trees and shrubs and reduced the size of gap openings showed reduced effects by providing adequate underground linkages for ECM fungi (Amaranthus, et al. 1994). Harvest prescriptions that retain hardwoods may in the short-term provide hosts for mycorrhizal species until conifers become reestablished.

Fuel treatment effects: Several studies that have examined the effects of natural and prescribed fire have found that the effects to fungal species are related to the intensity of the fire within the species' habitat. Fires that do not fully consume the large woody debris, litter, and organic layer have reduced effects on fungi (Stendall, et al. 1999, Miller, et al. 1994, Miller, et al. 1998, Jonsson, et al. 1999). Fuel treatment prescriptions that retain adequate live overstory, understory, and shrub species would retain sufficient host species to form mycorrhizal connections, and would serve to retain moisture at the site.

Saprophytic fungi species: No specific studies have been found that have examined the effects of logging and fuel treatment activities specifically upon saprophytic species. The effects are likely to similar to those seen upon mycorrhizal species, which require canopy cover and large woody

material to retain moisture levels within the habitat. This effects analysis is based on the assumption that the relationship would be similar to that seen in the studies cited above.

Cudonia monticola, *Dendrocollybia racemosa*:

Timber harvest effects: Fungi species that are saprophytic do not depend upon mycorrhizal connections with live vascular plants, and thus are not directly affected by logging or fuel treatments that remove or kill vascular plants. Saprophytes can be affected by canopy removal however, if it reduces the amount of cover needed to retain moisture within the litter layer. This effect is likely to be greatest in clear-cuts, less in small patch cuts, and least in thinning prescriptions which retain a stand density and canopy cover that provides shading for moisture retention and that would foster the increased growth of the remaining trees. Canopy removal can affect fungi species if there is not an adequate recruitment source for large woody material, needles, leaves, and other organic material.

Fuel treatment effects: Fire may be a threat to species that depend upon organic matter for survival if adequate down woody material is not retained. The effects are likely to be similar to that seen in mycorrhizal species – fuel treatments that do not fully consume the large woody debris, litter, and organic layer would have reduced effects on fungi.

Both species groups: The conifer forests present within the Klamath region burned at a frequency that maintained more open forests than that which is currently present (Taylor and Skinner 1998). Fire scars in the project area show historic, low intensity fire frequencies of 10-25 years prior to fire suppression. Historically, the forests within the project area have developed for years in the presence of low intensity fire. If any of the four fungi species of concern are present within the project area, they have likely adapted to the presence of fire along with their habitat. High-intensity, stand replacing fires can extirpate fungi populations by killing all live canopy and consuming all woody debris. Commercial thinning of the overstocked younger stands followed by fuel treatment of excessive fuels can be beneficial to the fungi species of concern by reducing the risk of stand replacing wildfires.

Associated activities effects: The timber harvest and fuel treatment restoration activities that are proposed, can have effects upon the fungi species of concern. Thinning of small diameter trees and shrubs is not likely to have an effect upon fungi populations where larger diameter trees are left present in the timber stand. Reforestation activities such as pre-commercial thinning are likely to be beneficial to fungi by increasing the rate of tree growth in young conifer stands. Removing the entire soil surface, vegetation, duff and woody debris during landing construction can have adverse effects upon fungi populations. Mastication of activity fuels, non-commercial trees and brush can reduce the amount of live trees and coarse and fine woody debris needed for fungi substrates, if an adequate canopy of live trees and shrubs are not retained. Conversely, reduction of the amount of fuels can benefit fungi by reducing the risk of stand replacing fires.

Baseline Value for the Likelihood Assessment

Table 5 summarizes the information described above in context of the existing conditions of the Sensitive fungi species presence and habitat condition within the project area. The score of these two factors will be combined with the score of factors pertaining specifically to project activities (see Table 3 above) in order to compare effects to Sensitive plant species between Alternatives. The bold text in the table is the selection for that Factor.

Table 5. Baseline Value for Likelihood of Effects to Sensitive Fungi Species of Concern

Factors	Components	Variations	Likelihood of Affects
1. Known Populations (x1)	There are currently no known sites of Sensitive fungi within the project area, however due to the difficulty of finding these species in the field a habitat evaluation is being completed, for this exercise presence will be assumed. If the Sensitive fungi do occur within the project area it is unlikely that there is a high level of overlap between the fungi and the proposed activity units because the fungi would mostly occur in the moister riparian areas of the project area which are buffered from treatment, however because presence is assumed for this exercise it will be assumed that they could occur within treatment areas.	Present, w/in activity units and connected actions →	Moderate (2)
2. Habitat Condition (pre-project) (x1)	The habitat components that the Sensitive fungi species require include canopy cover (shade), moisture, and associated species which would include a diversity of conifers, hardwoods, and shrubs. These habitat conditions are adequate within the project area, the main risk to these habitat conditions would be a stand replacing fire.	Habitat is currently adequate and providing necessary components, habitat is somewhat general and may recover from change. →	Moderate (2)

Baseline Habitat Presence/Condition Score = 4

A likelihood value of 4 indicates that the habitat within the project area is currently present and functioning at a level that is providing the necessary requirements for the species. There is a low likelihood that the habitat under current conditions is not providing the necessary components for the fungi species being analyzed to maintain viable populations.

Environmental Consequences

Ground disturbance and alterations of the light, moisture, and nutrient regimes within forest and associated plant environments can affect sensitive plants and their habitats. These effects can take two forms; either the actual destruction of individuals in a population or the adverse modification of suitable habitat considered critical to maintenance of viable populations (direct effects), or the modification of habitat to the extent that it prevents future colonization of the site by a species (indirect effect)

Alternative 1 – No Action

Under the No Action Alternative, the current conditions in the project area would continue to develop as currently managed.

Direct Effects and Indirect Effects

Under this Alternative, the current fuels and wildfire defensibility conditions would continue within the project area leaving a stand replacing wildfire as the biggest threat to these species and their habitat. Changes to the habitat within the project area may happen over time in the absence

of a stand replacing wildfire however; these changes would most likely not affect species viability. Table 6 displays the likelihood assessment for the No Action Alternative.

Table 6. Results of Likelihood of Effects analysis to Sensitive plant species for the No Action Alternative.

Factors	Components	Variations	Likelihood of Affects
Baseline Score from Affected Environment = 4			
3. Habitat Alteration Expected as a Result of Action Alternatives (x2)	Under the No Action Alternative there would be no implementation of proposed project activities, additionally the project design features and best management practices would not be implemented. This Alternative would result in no direct alteration to habitat components as a result of project activities.	Complete Avoidance, no alteration w/in population or contributing habitat components. →	Low (1)
4. Habitat Condition After Project Implementation (Indirect Effects) (x2)	In the absence of stand replacing fire within the Sensitive Fungi species habitat in the project area in the future, there may be indirect effects to individuals from changes in habitat characteristics over time; however this would most likely not affect species viability.	Habitat adequate and providing necessary components →	Low (1)

Baseline Habitat Presence/Condition Score = 4

Likelihood of Effects Score = 4

Total = 8

The combined likelihood assessment score for the No Action Alternative is *Low (Likelihood Score = 5-10)*: Existing Sensitive species populations and/or suitable habitat not likely affected.

The likelihood that project activities would cause a change in population viability to Sensitive Plant Species within the analysis area:

There is a low likelihood that the No Action Alternative would cause a change in population viability to Sensitive Fungi populations that may occur within the project area. In the absence of a stand replacing wildfire the habitat components that these species require would likely persist over time.

The likelihood that project activities would cause a change in population viability that would lead towards a trend to federal listing or loss of species viability across its range:

There is a very low likelihood that the No Action Alternative would cause a change in population viability that would lead towards a trend to federal listing or loss of species viability across its range. None of the fungi species of concern for this project area are restricted specifically to this project area, in the event of a stand replacing wildfire within the project area, populations of these fungi species would remain viable within other areas of their distribution.

Cumulative Effects

Because viable populations will remain, there will be no cumulative effects from the No Action Alternative.

Alternatives 2 & 3

Alternatives 2 and 3 will be analyzed jointly for the effects to the Sensitive fungi species of concern, these alternatives have the same footprint on the ground, Alternative 3 has more skips incorporated into the prescriptions and therefore the effects of Alternative 3 would be slightly less than from Alternative 2, but not enough to influence the measurement of analysis indicators for Sensitive plant species of concern.

Because there is an overall low probability that the fungi species of concern are present within the proposed project activity areas, there is also a low potential for an effect to individual fungi populations. If present, these species would most likely occur on north facing riparian areas adjacent to perennial streams within mature timber stands.

Direct and Indirect Effects

Table 7 below outlines the likelihood of effects to plant species of concern for Alternatives 2 and 3, further specific interactions that are important to analysis are described below. Table 7 below outlines the likelihood of effects to plants species of concern for Alternatives 2 and 3, further specific interactions that are important to analysis are described below the table.

Table 7. Likelihood of Effects to Plant Species of Concern for Alternatives 2 & 3

Factors	Components	Variations	Likelihood of Affects
Baseline Score from Affected Environment = 4			
3. Habitat Alteration Expected as a Result of Alternative 2 or Alternative 3 (x2)	Under Alternatives 2 & 3 there would be implementation of the proposed project activities, these activities may take place within potential fungi habitat, however project design features and best management practices would be implemented to reduce habitat disturbance and maintain important habitat components.	Complete Avoidance, no alteration w/in population or contributing habitat components. →	Low (1)
		Minimal disturbance, disturbance will be implemented with the purpose of maintaining/improving habitat components specific to plant species. →	Moderate/Low (2)
		Disturbance to plant habitat will be moderate, basic habitat requirements will be maintained, but at lower levels than currently exist. →	Moderate/High (3)
4. Habitat Condition After Project Implementation	The treatments that are proposed within the areas that are most likely to support the sensitive fungi populations (riparian areas) are	Disturbance to plant habitat will be high, basic habitat components that are required may not be maintained at a level that would support continued viability. →	High (4)
		Habitat adequate and providing necessary components →	Low (1)
			Moderate (2)

(Indirect Effects) (x2)	designed to benefit the health and structure of the stand, and maintain important riparian habitat condition. These treatments are also likely to make these stands more resilient to stand replacing wildfires.	Habitat at risk or barely providing necessary components (further explanation below) → Not functioning →	High (3)
----------------------------	--	---	----------

Baseline Habitat Presence/Condition Score = 4

Likelihood of Effects Score = 6

Total = 10

The combined likelihood assessment score is a 10 for Alternatives 2 & 3, considered *Low* (*Likelihood Score* = 5-10): Existing Sensitive species populations and/or suitable habitat not likely affected.

The following discussion of the individual components of the proposed actions in Alternatives 2 and 3 are an expansion of the discussion in

Table 7 above, these are the specific interactions that are occurring within the analysis area for Sensitive fungi species and how they may affect these species:

Silvicultural Treatment Effects:

Commercial Treatments could have direct effects to fungi habitat in the form of direct mechanical disturbance. Adequate live trees will be retained and will provide shade to the site to retain moisture, there will be no indirect effect through the long-term loss of habitat. Riparian areas of the project contain the most suitable fungi habitat and have the highest likelihood of supporting fungi populations, where treatment is proposed in the riparian areas, however, the implementation of project design features that are designed to protect riparian conditions will also serve to maintain necessary fungi habitat components. Furthermore, where treatment occurs in a Riparian Reserve the remaining stand will be in a condition that meets the Aquatic Conservation Strategy (ACS) standards and guidelines, meeting the ACS standards and guidelines would in turn maintain important habitat components necessary to support viable populations of fungi.

Non-commercial Harvest: Areas where pre-commercial harvest are proposed are not within suitable habitat for sensitive fungi and will not have any direct or indirect effects.

In general, there will be minimal direct effects to fungi habitat from timber harvest due to the high probability that the fungi would occur in areas that will have treatment occurring only to meet ACS objectives. However, these treatments will have positive indirect effects in the long-term, because these stands will be moved towards desired conditions for forest health and structure and fire resilience.

Connected Actions:

No new road construction is proposed. Existing National Forest Transportation System roads, existing roadbeds and temporary roads will be used for project implementation. No new temporary access roads will be created outside of the harvest units, 1.05 miles of existing roadbeds will be used as temporary roads for short-term access, existing roadbeds are not habitat for the Sensitive fungi species, and this will have no effects on these species.

Landing construction has the potential to directly affect individuals or portions of a Sensitive fungi population, however, no landings will be constructed in Riparian Reserves where the fungi are most likely to occur. Landing construction accounts for a very small percentage of the total project area, this will not add up to enough altered habitat to consider indirect effects to Sensitive fungi populations. These activities may affect individuals but are not likely to affect species' viability within a population; there will be no indirect or cumulative effects from these activities.

Fuel Treatment Effects:

For underburning areas the fire intensities will be low within fungi habitat. The fuel treatments will be designed to reduce smaller diameter ground fuels and a portion of the ladder fuels and will mainly affect the understory vegetation. Prescribed fires of this type burn in a patchy mosaic that does not consume all of the understory trees and shrubs. A diverse mix of species in these layers will be maintained within the fungi habitat. There may be a direct effect to a portion of individual fungi populations if they occur in the proposed prescribed burn/underburn areas. Because mycorrhizal and saprophytic fungi have large underground systems, this is not likely to affect a population in its entirety. Fungi species readily regenerate after impacts to a portion of the population as long as adequate habitat components are maintained. However, there shouldn't be any direct effects to fungi populations within the wildland urban interface, strategic ridgeline fuel break and the roadside fuel treatment areas, because there isn't any fungi habitat within those proposed fuel treatment areas. There will be no indirect effects to the fungi because the habitat will not be affected to the extent that it will no longer be suitable for the Sensitive fungi species.

Analysis Indicators measure of direct and indirect effects of Alternatives 2 and 3:

The likelihood that project activities would cause a change in population viability to Sensitive Plant Species within the analysis area:

There is a low likelihood that Alternatives 2 or 3 would cause a change in population viability to Sensitive Fungi populations that may occur within the project area.

The likelihood that project activities would cause a change in population viability that would lead towards a trend to federal listing or loss of species viability across its range:

There is a very low likelihood that Alternatives 2 or 3 would cause a change in population viability that would lead towards a trend to federal listing or loss of species viability across its range. None of the fungi species of concern for this project area are restricted specifically to this project area.

Cumulative Effects

There is the potential for direct effects as a result of implementing Alternatives 2 or 3, however, there are no other ongoing or reasonably foreseeable future actions that would incrementally add to these effects. Viable populations if they occur, are very likely to persist in this project area after project implementation and it is highly unlikely that any reasonably foreseeable future action would affect the likelihood of viable populations remaining on this landscape in the long-term. Additionally, any future projects proposed within this project area would also incorporate similar project design features to protect riparian habitat.

Analysis Indicators measure of cumulative effects of Alternatives 2 and 3:

The likelihood that project activities would cause a change in population viability to Sensitive Plant Species within the analysis area; The likelihood that project activities would cause a change in population viability that would lead towards a trend to federal listing or loss of species viability across its range:

Because habitat will be maintained and the direct effects would not eliminate any potential existing populations there will not be a cumulative effect from this and other project activities occurring in the analysis area and viable populations would remain. Best management practices and project design features that are created to meet ACS objectives and protect riparian areas will minimize potential adverse impacts and retain habitat elements necessary to support mycorrhizal and saprophytic fungi species. The only action that is ongoing or a foreseeable future action that could potentially overlap spatially with the minor indirect effects from the project would be grazing or livestock use near the Lover's Canyon trailhead that is used for access into some of the allotments. Monitoring of the species that occur in this area indicate that there has been no livestock or grazing use effects observed within these population boundaries, the species in this area grow in densely forested areas that are not desirable or very accessible for cattle or livestock use. There are no direct or indirect effects observed as a result of grazing or livestock use within any of the Sensitive Plant populations in the project and therefore, no cumulative effects associated with any other uses within the area.

Summary of Effects

In both alternatives, there may be direct effects to individuals, but there would not be indirect or cumulative effects to populations or their habitat. There will be no change to the species' viability within the project area, on the Klamath National Forest or throughout the species' range.

Table 8: Summary of Effects to Sensitive Fungi Species of Concern

Indicator	Alternative 1	Alternative 2	Alternative 3
Likelihood that project activities would cause a change in population viability to Sensitive Plant Species within the Analysis Area.	Low	Low	Low
Likelihood that project activities would cause a change in population viability that would lead towards a trend to federal listing or loss of species viability across its range	Very Low	Very Low	Very Low

Determination of Effects

Adequate botanical assessment has been completed for this Biological Evaluation. This was based on recommendations in the Botanical Review for this project, and this botanist's professional judgment.

No Action Alternative

No federally listed threatened, endangered, or proposed plant species will be affected by this project.

Under the no action Alternative it is my determination that the Lover's Canyon Project **may affect individuals but is not likely to result in a trend toward federal listing or a loss of viability** for the Sensitive species: *Boletus pulcherrimus*, *Cudonia monticola*, *Dendrocollybia racemosa*, and *Phaeocollybia olivacea*.

Alternatives 2 & 3

No federally listed threatened, endangered, or proposed plant species will be affected by this project.

Under Alternatives 2 & 3, it is my determination that the Lover's Canyon Project may affect individuals but is not likely to result in a trend toward federal listing or a loss of viability for the Sensitive plant species: Boletus pulcherrimus, Cudonia monticola, Dendrocollybia racemosa, and Phaeocollybia olivacea. Compliance with law, regulation, policy, and the Forest Plan

The Lover's Canyon Project complies with Forest Service Policy (FSM 2670). The Lover's Canyon Project complies with the Klamath National Forest LRMP Standards and Guidelines for Sensitive plant species.

Non-Native Invasive Plant Species Risk Assessment Report

Introduction

This weed risk assessment analyzes the effects of the proposed project upon Klamath National Forest listed non-native and invasive plant species within the project area boundary. The Klamath National Forest has placed a high priority on management of noxious weeds, which includes reducing management related introduction and spread of noxious weeds on the Forest (USDA 2001). The purpose of this section is to evaluate the Lover's Canyon Project in sufficient detail to determine its effects on noxious weed species. This risk assessment follows the standards established in the Forest Service Manual direction (USDA 2011).

Forest Service Manual 2900 Invasive Species Management (USDA 2011) includes a policy statement calling for a risk assessment for noxious weeds to be completed for every project. Specifically the manual states:

- Determine the risk of introducing, establishing, or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to reduce or eliminate that risk prior to project approval.
- Use contract and permit clauses to require that the activities of contractors and permittees are conducted to prevent and control the introduction, establishment, and spread of aquatic and terrestrial invasive species. For example, where determined to be appropriate, use agreement clauses to require contractors or permittees to meet Forest Service approved vehicle and equipment cleaning requirement/standards prior to using the vehicle or equipment in the National Forest System.

The Forest Land and Resource Management Plan includes Forest-wide Standards and Guidelines for vegetative management that call for all silvicultural practices to consider how to best prevent introducing noxious or alien weeds. (USDA 1995, p.4-50).

Additional direction is found in Executive Order #13112. *Invasive species. Order by President Bill Clinton to prevent the introduction of invasive species and provide for their control* (1999).

- Identify actions that may affect the status of invasive species.
- Use relevant programs and authorities to: (a) prevent the introduction of invasive species; (b) detect and respond rapidly to and control populations in a cost effective and environmentally sound manner; (c) monitor; (d) restore; (e) research; and (f) promote public education on invasive species.
- Not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species.
- Coordinate these duties with the National Invasive Species Council that coordinates Federal strategies to address the problem of noxious weeds.

Methodology

The Forest Service has adopted the International Data Standards for the Inventory, Monitoring, and Mapping of Invasive Plants (USDA 2008), and incorporated those standards into a field guide: Invasive Plant Inventory, Monitoring, and Mapping Protocol (USDA 2008). The National Resource Information System (NRIS) is the database of record for non-native and invasive plant species populations. This database and the Forest GIS noxious weed layer were used for information on non-native and invasive plant species sites that are currently mapped within or adjacent to the project area. Inventory within the project area was conducted in 2012 and 2013. Surveyors were trained in the identification of the target species.

In addition, annual weed inventories are conducted throughout the Klamath National Forest on a rotating basis across the landscape. If new invaders are discovered, immediate hand pulling treatment is planned for high-priority weed sites.

The California Department of Food and Agriculture, and the Siskiyou County Department of Agriculture manage weeds by use of the same list and risk rating criteria (CDFA 2010). There are approximately 38 species of State and County listed noxious and invasive weeds known within the Klamath National Forest. The State and County listing process was developed primarily to address agricultural concerns. The California Invasive Plant Council (Cal-IPC) identifies species that may threaten forest and rangeland ecosystems in their *California Invasive Plant Inventory* (Cal-IPC 2006).

The Klamath National Forest Noxious Weed and Non-native Invasive Plant List (Appendix B) includes high priority plants (H) from the State and County lists that are known or expected to occur on the Klamath National Forest. Based on inventories and current understanding or species' ranges, a total of twenty-nine high priority weeds are on the *Klamath National Forest Noxious Weed and Non-native Invasive Plant List*. There are fifteen species of moderate and low priorities also included on the list that may be addressed in projects if those species are a problem locally. This list is used for resource management and decision making, and is subject to change to reflect new information.

Analysis Indicators

- Risk of spread and/or introduction of Noxious Weeds

Measures

A risk analysis will be conducted based on current distribution of weed species in habitats similar to those found in the proposed treatment areas and on the types of proposed project activities. The estimation of risk of weed spread and introduction of new weed invaders from the proposed activity is based on peer-reviewed literature, experience in the project area and on similar sites in the Forest, and professional judgment.

Effects of proposed actions on noxious weed spread are based on the amount of canopy removal, on the predicted amount of soil and/or understory vegetation disturbance, and on the predicted effectiveness of the project design features in each alternative. Proposed actions with greater disturbance of existing vegetation and with greater soil disturbance would have a higher risk of weed spread.

The risk of introducing or spreading noxious weeds with the proposed activities are generally described as very low, low, moderate, or high, with the following definitions:

- *Very low* = no measurable effect on existing weed infestations or susceptible habitat.
- *Low* = existing weed infestations and/or susceptible habitat not likely affected.
- *Moderate* = existing weed infestations or susceptible habitat affected, with the potential for expansion into un-infested areas and/or establishment of new invaders.
- *High* = weed infestations and/or susceptible habitat affected, with a high likelihood of expansion into un-infested areas and/or establishment of new invaders.

Interactions Important to Risk Assessment Analysis

The following risk assessment was developed to standardize the process for determining the risk of introducing or spreading noxious weeds associated with a project. Table 9 summarizes the flow of analysis to determining the overall risk of the alternatives for this project. The first three factors establish the baseline pre-project risk that exists within the project area; these factors are discussed in the affected environment section below. Factors 4, and 5 determine the added risk from implementing a project alternative, these factors are discussed in the Environmental Consequences section for each alternative below.

Table 9. Risk Assessment by Factor

Factors	Variations	Risk
1. Known Non-Native and Invasive weed sites	None present, none adjacent →	Low risk
	None present, weeds adjacent along access routes →	Moderate Risk
	Weeds present and adjacent →	High Risk
2. Habitat Vulnerability	High cover, low disturbance →	Low risk
	Moderate cover, disturbance →	Moderate Risk
	Open, un-infested habitat, and/or high previous disturbance →	High Risk
3. Non-project dependent vectors	Minimal current vectors →	Low Risk
	Moderate current vectors →	Moderate Risk
	Abundant current vectors →	High Risk
4. Habitat alteration expected as a result of project	Low disturbance; minimal shade and duff removal →	Low Risk
	Moderate disturbance, shade and duff removal →	Moderate Risk
	High ground disturbance, shade and duff removal →	High Risk
5. Increased vectors as a result of project implementation	No access improvement; minimal project-related traffic →	Low Risk
	Minimal road construction; short-term traffic increase →	Moderate Risk
	Road or facility construction →	High Risk

Spatial and Temporal Bounding of Analysis Area

Transport of weed seeds into or out of the project area is possible, with occasional transport over long distances (such as vehicles). However, it would be difficult to predict the extent of such long-distance dispersal. It is likely that most seeds of noxious weeds would fall close to the parent plant. In addition, road systems and lands adjacent to the project area have noxious weed infestations similar in composition and distribution to those in the project area and therefore

would have little additional impact. For these reasons, the cumulative effects analysis area for noxious weeds is the project area.

The short-term temporal boundary is directly after project implementation and the long-term is time required for disturbed areas to recover, five to ten years.

Affected Environment

The Klamath National Forest has a list of noxious and non-native invasive plants that are a concern on the Forest (Appendix B). A high priority weed species is one that is of important local management concern because it has a limited distribution on the Forest, highly invasive nature, and demonstrated potential to displace large geographic areas of native plant communities. Emphasis is given primarily to high priority weed species. Low and moderate priority species are of lesser concern and may be addressed in project if those species are a problem locally. Priority for treatment is also given geographically, and can include high, medium, and low priority species if they occur in areas that are subject to high probability of dispersal, or are vulnerable to invasion.

The narrative below is the analysis of the first three factors described in Table 9 above, analyzing each factor in relation to the proposed project to derive an assessment of the level of risk. These first three factors will be combined to determine the baseline pre-project risk that exists in the project area. The factors in the table are evaluated individually as well as cumulatively. For example, if no weeds are present in the project area but weeds are adjacent and the habitat is not considered vulnerable to establishment (e.g. Forest), then the overall rating would be low. If the habitat in this scenario was vulnerable (e.g. grassland or disturbed) the overall rating would be moderate to high depending on how the other factors rated out.

1. ***Known Noxious Weeds Present and Adjacent:***

Known Sites:

There are five known infestations of Dyer's woad (*Isatis tinctoria*), one infestation of White top (*Cardaria draba*), and one infestation of Yellow star thistle (*Centaurea solstitialis*) within the project area. All infestations occur roadside, and are managed by the Forest Noxious Weed Crew. The main access road into the project area is a County maintained road. It is unlikely that infestations would be transported from the County road into the project area because the County road infestations are off the shoulder of the road and due to the distance of transport into the project area. Project design features have been incorporated into the proposed action to reduce the risk of these infestations spreading as a result of project activities. Because the weeds in the project area are managed and with the incorporation of project design features the overall risk from known noxious weeds present and adjacent is **Low**.

Species Accounts:

Dyer's woad – *Isatis tinctoria* – ISTI

Dyer's woad, originally from south eastern Russia, is a winter annual, biennial, or short-lived perennial. It is primarily found in rangeland, agricultural, disturbed areas, and undisturbed natural areas in the intermountain west. Plants germinate in the fall or early spring, producing rosettes in spring, and then overwinter. The following spring the rosette bolts, and one or more flowering stalks are produced from each rosette (CDFA 2013).

Dyer's woad flowers from April to June and until August in higher elevations and take approximately 8 weeks to produce viable seed (NWCB 2009). If the plant is mechanically injured, re-sprouting can occur from the taproot near the crown of the plant for several years (NWCB 2009). Each plant can produce 350-500 seeds on average (Zouhar 2009). Seeds are dispersed by vehicles along roadways, along waterways, by rodents caching seeds, and by some animals through ingestion. Seeds are spread as a contaminant in feed, crop seed and bedding. The seeds fall usually within 22" of the parent plant, but wind can disperse seeds up to 8 feet (NWCB 2009). Dyer's woad is a B-rated species for the state and a moderate priority for the Klamath NF. Dyer's woad is found throughout the Klamath NF and is expanding its range. There are over 230 infestations mapped on the Klamath NF which is only a portion of what actually exists. This species is only treated where it is found in an isolated infestation or threatens Wilderness Areas, Botanical Areas, or other special habitat areas.

Known sites within the project area: The known sites within the project area are managed by hand pulling methods annually by the Forest Noxious Weed crew. These infestations threaten Wilderness Areas and are considered higher priority than other Dyer's woad infestations on the Forest. These infestations have been reducing in size with management activities, it is unlikely that these infestations will spread, and if any new infestations were discovered they would also be treated immediately.

White top – *Cardaria draba* – CADR

Cardaria draba is an erect perennial that can tolerate a wide range of soil types and moisture conditions. They typically occur in disturbed open sites, fields, agricultural areas, roadsides, and ditches. This species can form dense infestations that crowd out native plants in open, un-shaded areas and can be difficult to eradicate due to the production of a deep tap root and their ability to spread vegetatively through fragmentation (DiTomaso and Healy 2007).

Known sites within the project area: There is one known infestation within the project area, however it has been five years since a plant was found at this site, for this analysis it will be assumed that this site has been eradicated and will not be analyzed further because there is no risk of spread. Additionally there are no proposed treatments within this site and there will be no ground disturbance to the area where the plants were last found.

Yellow star thistle – *Centaurea solstitialis* – CESO3

This species is an annual to biennial plant that grows up to 2 meters tall and has multiple branched stems with many flower heads subtended by spiny bracts. Plants reproduce by seed, with large plants producing as many as 75,000 seeds. *Centaurea solstitialis* was originally introduced into California from the Mediterranean region around 1850 and currently infests approximately 20 million acres in California. Plants occur in open, disturbed areas such as roadsides, burns, and logged areas, and can spread rapidly into habitats with open canopies such as grasslands and oak woodlands (DiTomaso and Healy 2007). Seeds are dispersed by wind, water, birds, and mammals, and human activities via numerous vector pathways. Seeds can remain viable in the soil for up to ten years (MSU 2001), however infestations under a successful treatment regimen where seed set is avoided show progress in three to four years. *Centaurea solstitialis* is a C-rated pest, and

a moderate priority for the Klamath National Forest (USDA 2013b) due to its widespread occurrence. Over 124 infestations have been identified on the forest, and there are larger areas of infestation that have not been incorporated into this database because it is so common. On the Klamath NF this species is treated where it is given priority due to proximity to wilderness, trailheads, and areas of botanical concern.

Known sites within the project area: There is one known infestation of *Centaurea solstitialis* known to occur within the project area. This site was first discovered in 2014 and was immediately treated with hand pulling methods. In 2015 no plants were located at this site, however, since there has only been one year of no plants recorded it will be assumed that there is still an active seed bank at the site, and project design features will apply.

2. *Habitat Vulnerability:*

Natural forested habitats: The natural stands in the project area are composed primarily of heavily forested mixed conifer stands dominated by Douglas-fir. Many stands in the project area have received some level of vegetation management within the last 20 years; these areas were susceptible to weed infestation after the treatments occurred. However, over time these areas have largely recovered from past disturbances and now have adequate shade and plant cover to compete with noxious weed infestations. This habitat type is typically less susceptible to noxious weed infestation than more open types. This habitat type represents the majority of the project area. This represents a **low** risk level.

Plantations: Plantations within the project area are at a higher risk of weed invasion than the natural forested habitats. Many plantations within the project area have lower shade levels and have received more disturbances in the past than natural areas; however there is still canopy cover and competition present. This habitat type represents a smaller portion of the overall project area and represents a **moderate** risk.

Meadow habitats: There is one meadow area in the project area adjacent to proposed project activities. This meadow habitat is open with moderate to high plant cover and low shade levels. This habitat type is typically more susceptible to noxious weed infestation than forested habitat types. The meadow itself is at a moderate risk, however this is a very small portion of the overall project area, and project design features will be incorporated that would protect the meadow characteristics leaving the current levels of plant cover intact, at the project level this is a **low** risk.

3. *Non-project Dependent Vectors:*

Non-project dependent vectors considered in this assessment include the potential transfer of seed by wind, vehicle use of the existing roads and spread of seed by livestock, and wild animal use of the area. Seed can be transferred from infested areas to non-infested areas by wind, vehicles and equipment using roads (most often in tire tread), and in animal's fur and digestive tracts. Seeds of Dyer's woad have a low chance of dispersing in the wind, seeds of Yellow star thistle have a higher chance of dispersing in the wind, but it is unlikely that any Yellow star thistle plants in the project area will go to seed due to current management. There are roads throughout the project area that receive a moderate to high amount of use due to the recreational access that the roads provide, seeds can be spread by recreational vehicular travel from within and from outside the

project area. There is a moderate to high level of livestock transport into the project area for access into the wilderness, the corrals and trailheads have a high risk of introduction from livestock feed and from seeds transported in livestock fur, feet, and digestive tracts. Birds are not known to favor Dyer's woad seeds, but do favor Yellow star thistle seeds, if they were to ingest seeds they could be spread through their digestive tracts. Because of the high recreational use of this area the non-project dependent vectors pose a **high** risk of weed introduction or spread.

Risk of Noxious Weed Introduction or Spread Pre-Project:

The combined risk of noxious weed introduction or spread pre-project is **low to moderate**; this area receives a high amount of traffic, including transport and holding of livestock, however, the Forest Noxious Weed Crew manages, inventories, and monitors the noxious weeds in the area annually which greatly reduces the risk of weeds spreading throughout the project area. The majority of the habitat in the project area is natural forested areas that are at a lower risk of infestation than more disturbed areas would be, weeds that are introduced into the project area are likely to remain roadside and would not quickly spread into these natural areas.

Environmental Consequences

Weeds are commonly found in disturbed areas. The presence of known weed occurrences in the project area could provide opportunities for weeds to spread or become established. Non-native and invasive plant species habitat is created when soil is disturbed, shade is removed, competing vegetation is removed and bare soil is exposed. Non-native and Invasive plant species have developed strategies that allow them to out compete native species by germinating and occupying land faster than native species under environmental conditions that are not as well tolerated by native species.

Project design features have been developed which have a high level of effectiveness, the potential for new weed site introduction through project activities would be reduced through equipment washing and the use of weed free seed and straw. This is expected to greatly reduce the amount of weed seed introduction into the project area. Heavy equipment would be excluded from the existing weed sites with the exception of pre- and post-haul road grading. This would prevent the transfer of seed into other areas in the project by equipment.

Continuation of the existing Forest weed monitoring and treatment would detect any new high-priority weed sites that may become established within the project area. Quickly treating these sites has a high probability of preventing new weed site establishment.

The narrative below is the analysis of how Factors 4 and 5 described in **Table 9** above will be impacted by the different alternatives proposed for this project, analyzing each factor in relation to the proposed project to derive an assessment of the level of risk. These first three factors were combined to determine the baseline pre-project value which was low to moderate. The factors in the table are evaluated individually as well as cumulatively, the baseline value will be added to each risk value determined below to compare the effects of the Alternatives.

Alternative 1 – No Action

Direct Effects and Indirect Effects

Habitat Alteration Expected as a Result of Project Implementation:

Implementation of the No Action Alternative, would result in no increase in suitable habitat for non-native and invasive plant species from project related activities. Suitable habitat for weeds decreases with full canopy closure. Lack of disturbance and maintenance of the canopy would continue to discourage the establishment of weeds, allowing native species to occupy the majority of the habitat in the project area.

Increased Vectors as a Result of Project Implementation:

Implementation of the No Action Alternative would result in no increase in vectors as a result of project implementation, and therefore would not increase the risk of introducing or spreading non-native and invasive plant species within the project area. Other factors that contribute to the introduction and establishment of weeds, such as transport on vehicles travelling through the project area, livestock spread of weeds, and wildlife spread of weeds would continue.

Summary:

The baseline risk value for this project area is **low to moderate** and implementation of the No Action Alternative would not increase or decrease that risk.

Cumulative Effects

There are no direct or indirect effects of the No Action Alternative, therefore no cumulative effects.

Alternatives 2 & 3

Direct and Indirect Effects

Habitat Alteration Expected as a Result of Project Implementation:

Commercial Treatments – Natural Stands: The openings created within dense canopies from the proposed thinning prescriptions are not likely to be subjected to invasion by weeds due to the preservation of shade and duff levels which inhibits germination of weed seeds. Weeds generally do not invade or persist in areas with moderate to high vegetative cover. Tractor timber harvest can create openings that are vulnerable to invasion by weeds and the risk is greater in these units than those that would use cable harvest systems. Project design features (Included in the Lover's Canyon Environmental Assessment) will lower the risk of introduction into tractor units. Habitat alteration in natural stands represents a **low** risk.

Plantations: In plantations, the risk of weed introduction is increased by the higher amount of canopy cover that would be removed from these stands. The increased amount of open understory would increase the area available for weed establishment. However, infestations would be unlikely to persist as canopy closure increases over time. Habitat alteration in plantations represents a **low to moderate** risk.

Fuels Treatments:

- Ridgetops: These treatments include thinning small diameter conifers to hand pile and burn, and mastication along strategic ridgelines. The removal of small conifers by hand to pile and burn is not likely to create habitat that is subject to invasion by weeds. This activity would not remove shade provided by overstory conifers and would have low disturbance to soil and duff layers. Mastication creates disturbed openings that are likely to be subjected to invasion by weeds. Project design features (Included in the Lover's Canyon Environmental Assessment) will reduce the risk of seed introduction in masticated areas. Habitat alteration from ridge top fuels treatments represents a **moderate** risk.
- Roadside: These treatments include manually thinning brush and small diameter trees within buffers on either side of the roads. The material will be hand piled and burned. Hazard trees will be identified and removed. These activities would create low levels of disturbance, but will decrease shade cover. Project design features (Included in the Lover's Canyon Environmental Assessment) have been incorporated into the proposed action to reduce the risk of spread as a result of these activities. Habitat alteration from roadside fuels treatments represents a **low to moderate** risk.

Prescribed Fire: Underburning can affect the introduction of non-native and invasive plant species by reducing the protective duff and making bare mineral soil available or by releasing seeds. Areas of pre-established weed infestations would be at greatest risk of spread since seed is already present within the soil. Studies have found that canopy cover is an important factor in the establishment of non-native plant species, with areas that retain high cover having the lowest risk of weed invasion (Rejmanek 1989). The proposed underburn would retain adequate over story, understory, and shrub layers in the forested habitats to suppress noxious weed invasions. Retaining adequate soil cover would reduce the likelihood that new infestations can occur. Habitat alteration from prescribed fire represents a **low to moderate** risk.

Increased Vectors as a Result of Project Implementation:

Road and Landing Construction Activities: The ground disturbance from reopening old landings or constructing new landings can create additional suitable habitat where introduced non-native and invasive plant species seeds can become established. Landings, however, represent a small area of the total acreage proposed for the project activities and a small percentage increase in the existing road and landing area. Just over one mile of existing road beds will be used as temporary roads, this will not create additional habitat that is susceptible to invasion because the road bed already exists. Habitat alteration from road and landing construction represents a **moderate** risk.

Increased Traffic during Project Implementation: The temporary increase of vehicle equipment traffic due to workers necessary for project implementation would be short-term. There would an overall short-term increase in vectors due to increased traffic during project implementation; this would be mitigated through the implementation of project design features, specifically equipment washing prior to project area entry. Overall, this poses a **low** risk for the introduction of noxious weeds.

Cumulative Effects

For the cumulative effects analysis, past, current, and foreseeable future actions include the activities listed in the Lover's Canyon Project file. This analysis also considers the proposed

actions in the Lover's Canyon Project, routine road maintenance activities which would occur independent of the currently proposed actions, current and ongoing recreational use and livestock use of the project area, and the project design features that would be incorporated into the proposed action.

Introduction of new weeds through natural processes such as wind, water, and wildlife would proceed unchanged in this Alternative. New weed sites may still be introduced through recreational vehicular use or livestock use of the project area. These sites would be detected and treated through the forest noxious weed program. Overall, when project design features are applied, there would be a **low** potential risk for cumulative effects.

Summary of Effects

Overall, there would be a **low to moderate** risk of introduction or spread of non-native and invasive plant species as a result of habitat alteration and increased vectors as a result of project implementation. When combined with the baseline pre-project risk rating the risk of introduction or spread due to Alternative 2 or 3 is **low to moderate**. The effectiveness of the proposed project design features has been factored into this risk rating as described above.

Table 10: Summary of risk of spreading and/or introducing Noxious Weeds.

Indicator	Alternative 1	Alternatives 2 & 3
Risk of spread and/or introduction of Noxious Weeds	Risk of spread and/or introduction of Noxious Weeds is low to moderate.	Risk of spread and/or introduction of Noxious Weeds is low to moderate because of our proposed project design features. Otherwise the risk could be moderate.

Compliance with law, regulation, policy, and the Forest Plan

Forest Service Manual 2900 and Forest Plan Standards and Guidelines require that all projects be evaluated for the risk of noxious weed introduction and spread as a result of project activities. In addition, projects must be designed to reduce the risk of weed introduction or spread. In the action alternatives, project design features have been incorporated which are expected to reduce the risk of weed introduction or spread. Forest Plan Standards and Guidelines and Manual direction will be met.

Botanical Review of Survey and Manage Plant Species

Introduction

Botanical review for Survey and Manage (S&M) bryophyte, lichen, fungi, and vascular plant species has been completed for the Lover's Canyon Project, Salmon/Scott River Ranger District, Klamath National Forest. The purpose of this review is to analyze the proposed project in sufficient detail to determine its effects on the plant species of concern.

Current Management Direction (Regulatory Direction)

In 1994, the U.S. Forest Service and Bureau of Land Management adopted standards and guidelines for the management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl, commonly known as the Northwest Forest Plan (NWFP) (USDA/USDI 1994). Mitigation measures were included for management of known sites, site-specific pre-habitat disturbing surveys, and/or landscape scale surveys for about 400 rare and/or isolated species, known as Survey and Manage, Protect from Grazing, and Protection Buffer species. In 2001, these agencies amended the Standards and Guidelines for these species to add clarity and provide more concrete direction for management of these species (USDA/USDI 2001). The document, referred to as the 2001 ROD (Record of Decision and Standards and Guidelines) divided these species up into six categories depending upon management objectives. The S&M species, their category assignments and the management direction for each category can be found within the 2001 ROD Standards & Guidelines, pp. 6-14, and in Table 1-1. That information will only be summarized here.

Of the six categories of S&M plants, only category A and C require surveys prior to habitat disturbing activities in addition to protecting known or high priority sites. For these categories, the Management Direction (S&G p.8) states:

Surveys will be conducted at the project level prior to habitat-disturbing activities, and in accordance with Survey Protocols to avoid loss of undiscovered sites by habitat-disturbing activities. Species sites found as a result of these surveys will be managed as known sites.

Survey protocols currently exist for bryophytes, fungi, lichens, and vascular plants (USDA 1997a, 1998a, 1998b, 1998c, 1999a, 2002, 2003a, USDA/USDI 1999, 2003, 2006). Management Recommendations have been issued for bryophytes, fungi, lichens, and vascular plants (USDA 1997b, 1999b, USDA/USDI 1997).

An annual species review requirement was a part of the 2001 ROD. As information is gathered about species associated with old growth and late-successional forests, modifications will be made to survey and manage requirements. The 2003 ASR memorandum changed the category placement for species displayed in Table 1-1 of the 2001 S&M ROD, as amended December 19, 2003 (USDA/USDI 2003b). Some species were removed from the list, and others changed category within the list and additional information was presented about the species' habitat and range.

The 2014 direction regarding the Survey and Manage Standards and Guidelines directs Agencies to follow the 2001 S&M ROD standards and guidelines, and the December 2003 species list, except for the red tree vole which remains a Category C, and/or the four categories of projects

exempt from the Survey and Manage Standards and Guidelines as stipulated by Judge Pechman (October 11, 2006; USDA 2006).

In addition, three of the six categories of S&M plants, Categories B, D, and E, require that existing known sites be managed, or that high-priority sites be managed. Species in these categories are to be managed according to currently available Management Recommendations.

Category B species: For Category B species, the 2001 Survey and Manage ROD requires the Forest Service and BLM to conduct strategic surveys to find additional new sites and to characterize habitat, improving the ability of the Agencies to know where to survey and how to manage and conserve the species (USDA 2001). The Forest Service and BLM may not sign NEPA decision documents for habitat-disturbing activities in old-growth forest in FY 2006 (FY 2011 for fungi) or later unless the agencies have completed strategic surveys in the province in which the project lies or equivalent effort surveys have been conducted in the old-growth habitat to be disturbed. See Appendix A-1 for a more complete discussion of how this requirement was met for the Lover's Canyon Project.

Summary: The Bureau of Land Management and the Forest Service adopted standards and guidelines for the management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl, commonly known as the Northwest Forest Plan (NWFP). The NWFP included measures for management of known sites, site-specific pre-habitat disturbing surveys, and/or landscape scale surveys for about 400 rare and/or isolated species. The standards and guidelines for these mitigation measures are known as survey and manage.

To be in compliance with the 2001 Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines (USDA/USDI 2001), projects must have pre-disturbance surveys conducted if the activity is potentially considered to be habitat-disturbing, and known sites must be managed to protect persistence at the site. "Habitat-disturbing activities are defined as those disturbances likely to have a significant negative impact on the species' habitat, its life cycle, microclimate, or life support requirements" (USDA/USDI 2001 – Standards and Guidelines, p. 22). Species-specific standards and guidelines, survey protocols, and management recommendations from the NWFP are identified below under species effects analysis, if applicable. The most recent Survey and Manage direction (May 13, 2014) directs Agencies to follow the 2001 S&M ROD Standards and Guidelines, and the December 2003 species list, except for the red tree vole which remains a Category C, and/or the four categories of projects exempt from the Survey and Manage Standards and Guidelines as stipulated by Judge Pechman (October 11, 2006, USDA 2006).

Methodology

Preliminary Botanical Review

An office preliminary field review was conducted to determine if the Lover's Canyon Project area contains any Survey & Manage populations and if suitable habitat is present within the proposed project area for species for which pre-project surveys would be required. During this review, the 2003 Survey & Manage species list was reviewed along with species occurrence and survey records to determine if Survey & Manage populations are present within the project area. Treatment unit selection criteria, site visits, aerial photographs, and species distribution

information were used to determine if suitable habitat for Survey & Manage species is present within treatment units.

During the preliminary botanical review, the proposed project area was determined to contain or require pre-disturbance surveys for the Survey & Manage species listed in

Table 11 below.

Table 11. Survey and Manage Species Present or Requiring Pre-Disturbance Survey in the Project Area

Species	Category	Type
Known to occur in project area (Pre-disturbance Survey Required for Category A & C, Protect Known Sites for Category B, D, and E)		
<i>Cypripedium montanum</i>	S&M – C (also FS Sensitive)	Plant
<i>Ptilidium californicum</i>	S&M – A	Bryophyte
<i>Clavariadelphus truncatus</i>	S&M – D	Fungi
<i>Cortinarius olympianus</i>	S&M – B	Fungi
<i>Turbinellus floccosus</i>	S&M – F	Fungi
Pre-disturbance Surveys Required (Suitable Habitat Present and w/in Range)		
<i>Cypripedium fasciculatum</i>	S&M – C (also FS Sensitive)	Plant
<i>Tetraphis geniculata</i>	S&M – A	Bryophyte
<i>Leptogium cyanescens</i>	S&M – A	Lichen
<i>Lobaria oregana</i>	S&M – A	Lichen
<i>Cladonia norvegica</i>	S&M – C	Lichen

Pre-disturbance surveys will be conducted for Category A and C species in project activity units where known sites and suitable habitat occur, except for those occurring in areas that are only proposed for roadside hazard tree removal. Roadside hazard tree removal is considered routine maintenance and populations in these units are exempt from pre-disturbance surveys. Known occurrences of Category B species within the project area will be protected for continued persistence at the site. Protection measures will include flagging, and avoiding the populations and nearby suitable habitat in order to maintain necessary habitat characteristics. Category F species have an undetermined status, and is not a Protect Known Site category.

Project specific surveys were conducted in April, May, June, and July of 2012; and June, July and August of 2013 in accordance with current S&M survey protocols. Surveys were intuitive controlled, traversing units and other activity areas searching for the specific habitats for the species of concern. Surveys were timed to correspond with the time period that each species could be most readily identified. Surveys were conducted by botanists trained in the identification of target species. Documentation includes traverse routes marked on topographic maps. For all units, forms were completed (see project file) which include the location of the unit, date of survey, seral stage and vegetation series, other habitat information, and a list of associated species. Unit surveys and any populations located were documented on survey and site report forms. Field surveys conducted within the general area and specifically for this project are adequate to determine the presence of Survey and Manage plant species that were surveyed for.

Analysis Indicators

- Compliance with Survey and Manage guidelines for bryophyte, fungi, lichen or vascular plant species.

Measures

In order to be in compliance with current Survey and Manage direction known sites and high priority sites must be protected. The analysis indicator for Survey and Manage species will be measured by whether or not the known sites within the project area are protected.

Spatial and Temporal Bounding of Analysis Area

The project area will serve as the spatial boundary for effects to the Survey & Manage species. All potential disturbance and effects to Survey & Manage species from this project will occur within this boundary. Additionally, effects from other present and foreseeable future activities will interact with effects of the proposed project only within the project area.

The temporal boundary for Survey & Manage species will be less than three years for the short-term effects and greater than three years for long-term effects.

Affected Environment

The NRIS database and the Klamath GIS S&M plant layer have been reviewed to search for known sites of Category A, B, C, D, and E species within the Lover's Canyon Project area (Appendix A) and pre-disturbance surveys were completed for Category A and C species for which there was suitable habitat. *Cypripedium montanum* is listed as Forest Service Sensitive in addition to its assigned Survey and Manage category; the effects to this species are analyzed in this section.

The results of the pre-disturbance surveys and review of known sites identified four Survey and Manage species for which known sites will be protected, summarized below in Table 12. (*Cypripedium montanum*, *Ptilidium californicum*, *Clavariadelphus truncatus*, and *Cortinarius olympianus*).

Table 12. Survey and Manage Survey Results

Known Sites and Number of Populations
<i>Cypripedium montanum</i> – 2 populations in project area
<i>Ptilidium californicum</i> – 2 populations in project area
<i>Clavariadelphus truncatus</i> – 1 population in project area
<i>Cortinarius olympianus</i> – 1 population in project area

Species Accounts:

Cypripedium montanum

Cypripedium montanum is a Category C species requiring pre-disturbance surveys, management of high-priority sites, and strategic surveys.

This species is a perennial orchid found scattered throughout the Northwestern US. It arises in early spring from a shallow rhizome and dies back by late summer. On the Klamath National

Forest, *C. montanum* populations occur in a broad range of habitats that vary greatly in soils, elevation, aspect, and plant community types. The majority of populations are located in moist sites on northern aspects with sufficient canopy cover to provide filtered light to the forest floor. However, populations have occasionally been found on dry slopes with open canopy structure and more direct light. On the Klamath National Forest, *C. montanum* populations range from 1,600 to 5,900 feet elevation.

Cypripedium montanum requires mycorrhizal associations with a fungus for germination and growth (Shefferson et al. 2005, USDA 2005b). *Cypripedium* seeds lack endosperm and thus cannot provide food to the developing embryo. Instead, this genus relies on an epi-parasitic relationship with a mycorrhizal fungus to gain nutrients (Kaye and Cramer 2005). The genus *Cypripedium* has been found to almost exclusively associate with a specific mycorrhizal family, the Tulasnellaceae (Shefferson et al. 2007). This genus also lacks a hard seed coat and therefore does not bank seed in the soil.

Cypripedium montanum populations do not typically survive high intensity fire in which the duff layer is consumed, but may survive low intensity fire that leaves the duff layer, some canopy cover, and some associated species. Additionally, mechanical disturbance of the rhizome is generally fatal.

Surveys on the Klamath National Forest for *Cypripedium montanum* have been on-going since 1980. There were 108 known populations of *C. montanum* on the Klamath National Forest prior to 2014, however, 21 of these are assumed extirpated following the 2014 wildfires. There are two known populations within the project area, both sites have been located and flagged, both sites have live healthy individuals present.

Ptilidium californicum

Ptilidium californicum is a Category A bryophyte species requiring the management of all known sites, pre-disturbance surveys, and strategic surveys. This species is endemic to the Pacific Northwest ranging from northern California to southeastern Alaska.

Ptilidium californicum typically occurs between 1,275 to 5,725 feet in elevation as an epiphyte on the bark at the base of large living mature fir trees, most often red fir, white fir, and Douglas-fir. It can also be found on decaying logs or stumps, on small diameter conifer and hardwoods in moist understories in the northern or more coastally influenced parts of its range. Disturbances that remove host trees such as severe wildfire or mechanical disturbances are likely to extirpate populations. Low intensity fires that may not kill trees but blacken the base of the tree where *P. californicum* grows may also extirpate populations. Monitoring of populations located in areas subjected to high intensity fires in the past five years have shown no recovery. The proliferation of *P. californicum* in northern California, which is the southern extent of the species' range, is possibly an artifact of fire suppression.

There were 109 known occurrences of *P. californicum* on the Klamath National Forest prior to 2014; however 6 populations are assumed extirpated following the 2014 wildfires. There are two populations present in the Project area, both sites have been relocated, flagged, and have healthy live individuals present.

Clavariadelphus truncatus

Clavariadelphus truncatus is a Category D fungi species requiring the management of all known high-priority sites and strategic surveys. Strategic survey for this species is complete, per the

Survey and Manage Category B Fungi Strategic Report from May of 2015 (USDA 2015). Within the California Northwest Forest Plan area this species occurs scattered in the Klamath and Cascade physiographic provinces. There are ten known sites on the Klamath National Forest, and one known site in the Lover's Canyon Project area.

Clavariadelphus truncatus occurs scattered to gregarious on soil or duff, under mixed conifers and fruits July through November. Sites located in California are primarily associated with Douglas-fir, and detections are evenly distributed between late mature/old growth, and mid-mature seral stages.

Clavariadelphus truncatus is a saprophytic species; these species obtain nutrients by the decomposition of dead organic matter. These fungi species are dependent upon adequate amounts of leaves, needles, limbs, large woody debris, and other decomposing forest litter to provide a substrate and to supply a continuous source of nutrients. These species are not dependent upon specific vascular plant hosts, but may require adequate canopy coverage to retain the moisture levels sufficient to support them. The potential for extirpation could be high where downed wood, large woody debris and litter are removed. Management should include retaining forest structure and soil conditions, and avoiding disturbance at known sites.

Cortinarius olympianus

Cortinarius olympianus is a Category B fungi species requiring management of all known sites and strategic surveys. Strategic survey for this species is complete, per the Survey and Manage Category B Fungi Strategic Report from May of 2015 (USDA 2015). Within the California Northwest Forest Plan area this species is known from the Klamath physiographic province. There are seven known sites on the Klamath National Forest, and one known site in the Lover's Canyon Project area.

Cortinarius olympianus is ectomycorrhizal with the roots of Pinaceae, and fruits from September to November. Ectomycorrhizal fungi form a symbiotic, mutually beneficial association between a fungus and plant root. This highly interdependent relationship is based on the translocation of mineral nutrients and water by the fungus to the host plant while the fungus obtains photosynthetic carbon from the host plant. Nutrients are transported through an underground network called mycelia. Mycelia can extend over several acres. Mycorrhizal fungi depend upon their host plant for carbohydrates.

These fungi are dependent upon the habitat elements that support the species and their vascular plant hosts throughout their life cycles. Adequate overstory, understory, and shrub layers of diverse species are required to support these species. Overstory tree cover is important to maintain high moisture levels within the forest litter and large woody debris. Management recommendations for *Cortinarius olympianus* are to maintain habitat at known sites by retaining old growth forest structure and soil conditions, including coarse woody debris. Additionally, avoid disturbance at known sites, including modification of canopy until additional data is collected on taxon viability (USDA 1997b).

Environmental Consequences

Each alternative is evaluated in terms of how the proposed activities would meet the requirements of the species specific Management Recommendations discussed above, if known

sites are present, and how the project would comply with the 2001 ROD (USDA and USDI 2001).

Alternative 1 – No Action

In this alternative, current management plans would continue to guide management of the project area.

Direct Effects, Indirect Effects, and Cumulative Effects

Cypripedium montanum, *Ptilidium californicum*, *Clavariadelphus truncatus*, and *Cortinarius olympianus*

Under Alternative 1 there will be no direct effects to any known populations of Survey and Manage plant species within the Lover's Canyon Project area from management activities, therefore, Alternative 1 is in compliance with the Survey & Manage direction.

Indirect effects to suitable habitat may occur through natural processes, but these will not affect project compliance with Survey & Manage direction. Because there will be no direct effects and there are not likely to be any indirect effects, there will be no Cumulative effects to any known sites as a result of Alternative 1.

Alternatives 2 & 3

Direct and Indirect Effects

Under Alternatives 2 & 3, there will be no direct effects to any known populations of Survey and Manage plant species within the Lover's Canyon Project area from management activities, because project activities will not take place where these populations occur. Therefore, Alternatives 2 & 3 are in compliance with the Survey & Manage direction.

Indirect effects to suitable habitat will not occur as a result of project implementation because these activities will not take place where these populations occur.

Cumulative Effects

Because there will be no direct effects and likely no indirect effects, there will be no Cumulative effects to any known sites as a result of implementing Alternatives 2 or 3. The only action that is ongoing or a foreseeable future action that could potentially overlap spatially with the minor indirect effects from alternative 1 would be grazing or livestock use near the Lover's Canyon trailhead that is used for access into some of the allotments. Monitoring of the Survey and Manage species that occur in this area indicate that there has been no livestock or grazing use effects observed within these population boundaries, the Survey & Manage species in this area grow in densely forested areas that are not desirable or very accessible for cattle or livestock use. There are no direct or indirect effects observed as a result of grazing or livestock use within any of the Sensitive or Survey and Manage Plant populations in the project and therefore, no cumulative effects associated with any other uses within the area.

Table 13: Summary of compliance to Survey and Manage Species

Indicator	Alternative 1	Alternatives 2 & 3
-----------	---------------	--------------------

Indicator	Alternative 1	Alternatives 2 &3
Compliance with Survey and Manage guidelines for bryophyte, fungi, lichen or vascular plant species	Alternative 1 is in compliance with the Survey & Manage direction.	Alternatives 2 & 3 are in compliance with the Survey & Manage direction.

Compliance with law, regulation, policy, and the Forest Plan

The Lover's Canyon Project complies with the 2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines.

Literature Cited

- Amaranthus, M. P., and Perry, D. A. 1994.** The functioning of ectomycorrhizal fungi in the field: linkages in space and time. *Plant and Soil*, 159: 133-140.
- Cal-IPC. 2006.** California Invasive Plant Inventory. *California Invasive Plant Council*. February 2006.
- CDFA Division of Plant Health and Pest Prevention Services. 2010.** Pest Ratings of Noxious Weed Species and Noxious Weed Seed. January 2010.
- CDFA 2013.** California Department of Food and Ag: Dyer's woad.
<http://www.cdfa.ca.gov/plant/ipc/weedinfo/isatis.htm>
- DiTomaso, Joseph M. and Evelyn A. Healy. 2007.** Weeds of California and Other Western States. Vol. 1. University of California Agriculture and Natural Resources.
- Durall, D. M.; Jones, M. D.; Wright, E. F.; Kroeger, P.; and Coates, K. D. 1999.** Species richness of ectomycorrhizal fungi in cutblocks of different sizes in the Interior Cedar–Hemlock forests of northwestern British Columbia: sporocarps and ectomycorrhizae. *Canadian Journal of Forest Research*, 29: 1322-1332.
- Hagerman, S.M.; Jones, M. D.; Bradfield, G. E.; Gillespie, M.; and Durall, D. M. 1999.** Effects of clear-cut logging on the diversity and persistence of ectomycorrhizae at a subalpine forest. *Canadian Journal of Forest Research*, 29: 124-134.
- Hoover, L.D. 2004.** Literature review pertaining to potential effects on fungi focusing on logging and fire. Six Rivers National Forest. April 20, 2004.
- Jonsson, L.; Dahlberg, A.; Nilsson, M.; Zackrisson, O. and Karen, O. 1999.** Ectomycorrhizal fungal communities in late-successional Swedish boreal forests, and their composition following wildfire. *Molecular Ecology*, 205-215.
- Miller, S.L., Torres, P. and McClean, T.M. 1994.** Persistence of Basidiospores and Sclerotia of Ectomycorrhizal Fungi and *Morchella* in Soil. *Mycological Society of America*. February 1994.
- Miller, S.L., McClean, T.M., and Stanton N.L. 1998.** Mycorrhization, physiognomy, and first-year survivability of conifer seedlings following natural fire in Grand Teton National Park. 115-122.
- MSU. 2001.** Montana Knapweeds: Identification, Biology, and Management. Montana State University Extension Service. 2001.
- NWCB 2009.** Washington State Noxious Weed Control Board.
http://nwcb.wa.gov/weed_info/Written_findings/Isatis_tinctoria.html.
- Parsons, W. F., Miller, S.L. and Knight, D. H. 1994.** Root-gap dynamics in a lodgepole pine forest: ectomycorrhizal and non-mycorrhizal fine root activity after experimental gap formation. *Canadian Journal of Forest Research*, 24: 1531-1538. 1994.
- Rejmanek, Marcel. 1989.** In: Merriam, Kyle E., Tom W. McGinnis, and Jon E. Keeley 2004. The role of fire and fire management in the invasion of non-native plants in California. *Park Science*, Vol. 22-2. Fall, 2004.
- Shefferson et al. 2005.** Adult Whole-Plant Dormancy Induced by Stress in Long-Lived Orchids. *Ecological Society of America. Ecology*, Vol. 86, No. 11. Pp. 3099-3104. November 2005.

- Shefferson et al. 2007.** The Evolutionary History of Mycorrhizal Specificity Among Lady's Slipper Orchids. The Society of the Study of Evolution. *Evolution* 61-6: 1380-1390. 2007
- Stendell, E.R.; Horton, T.R.; and Bruns, T. D. 1999.** Early effects of prescribed fire on the structure of the ectomycorrhizal fungus community in a Sierra Nevada ponderosa pine forest. 103: 1353-1359. January 14, 1999.
- Taylor, A. H., and Skinner, C. N. 1998.** Fire history and landscape dynamics in a late-successional reserve, Klamath Mountains, California, USA. *Forest Ecology and Management*, 285-301.
- USDA Pacific Southwest Region. 1995** (updated through 2010). Land and Resource Management Plan: Klamath National Forest. Yreka, CA.
- USDA. 1997a.** Survey protocols for Survey and Manage Component 2 Bryophytes. Version 2.0. December 11, 1997.
- USDA. 1997b.** Management Recommendations for Survey and Manage Fungi, Version 2.0. September 1997.
- USDA. 1998a.** Survey Protocols for *Bridgeoporus nobilissimus* Fungi. Version 2.0. Hibler & O'Dell, September 17, 1998.
- USDA. 1998b.** Survey Protocols for Component 2 Lichens. Version 2.0. March 12, 1998.
- USDA. 1998c.** Survey Protocols for Survey and Manage Strategy 2 Vascular Plants. December 1998.
- USDA. 1999a.** Survey Protocols for Protection Buffer Bryophytes. Version 2.0. December 3, 1999.
- USDA. 1999b.** *Handbook to Strategy 1 Fungal Species in the Northwest Forest Plan*
- USDA. 2001.** Noxious and Invasive Weeds Program Strategy, Northern Province. Prepared by Ken Coop and Anne Yost. USFS, Shasta-Trinity and Klamath National Forests. Redding and Yreka, California. October 22, 2001.
- USDA. 2002.** Survey protocols for Category A and C Lichens. 2002.
- USDA PNW Research Station 2003.** Handbook to Additional Fungal Species of Special Concern in the Northwest Forest Plan. January 2003.
- USDA. 2005a.** Forest Service Manual 2670, Wildlife, Fish, and Sensitive Plant Management. Washington, D.C. P.8-10 (FSM 2670-2671). September 23, 2005.
- USDA. 2005b.** Conservation Assessment for *Cypripedium fasciculatum* and *Cypripedium montanum*, Region 5-USDA Forest Service. September 2005.
- USDA. 2006.** Stipulation and (Proposed) Order RE: Injunction, Case No. C04-844-P. Hon. Marsha J. Pechman. U.S. District Court Western District of Washington at Seattle, October 11, 2006. Unpublished document on file, Supervisor's Office, Klamath National Forest, Yreka, CA.
- USDA, Forest Service. 2008.** *Data Recording Protocols for Invasive Species Management*. Available at http://fsweb.wo.fs.fed.us/invasivespecies/data/documents/DataRecProtocolsInvSppMgt_v040108.pdf.
- USDA. 2011.** Forest Service Manual 2900, Invasive Species Management. Washington, D.C.
- USDA. 2013a.** 2670: *Federally Listed and Sensitive Plant Species*. July 2013. Klamath National Forest.

- USDA. 2013b.** *Klamath National Forest Noxious Weed and Nonnative Invasive Plant List*. March 29, 2013.
- USDA. 2015.** Survey and Manage Category B Fungi Strategic Survey Report. May 2015
- USDA and USDI. 1997.** Survey and Manage Recommendations – Fungi. BLM Instruction Memorandum No. OR-98-003. October 20, 1997.
- USDA and USDI. 1999.** Survey Protocols for Seven Survey and Manage and Protection BufferFungi. Version 1.3. December 9, 1999.
<http://www.blm.gov/or/plans/surveyandmanage/SP/Fungi/PBFungi/m2000-018.htm>
- USDA and USDI. January 2001.** Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents within the Range of the northern spotted owl.
- USDA and USDI. 2003a.** Survey Protocols for Survey & Manage Category A&C Lichens. Version 2.1 September 2003.
- USDA and USDI. 2003b.** Implementation of 2003 Survey and Manage Annual Species Review. BLM Instruction Memorandum No. OR-2004-034. December 19, 2003.
- USDA and USDI. 2006.** Equivalent Effort Surveys for Survey and Manage Category B Species; and Survey Methodology for One Lichen Species within Category Change from 2003 Annual Species Review. BLM Instruction Memorandum No. OR-2006-038. April 3, 2006.
- Zouhar, Kris. 2009.** *Isatis tinctoria*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [Accessed 2015, January 14].

Appendix A– Klamath Sensitive Plant Species List

FEDERALLY LISTED AND SENSITIVE PLANT SPECIES Section 7 ESA, FSM 2670 KLAMATH NATIONAL FOREST November 2015

(This list supersedes all similar lists bearing earlier dates. It is subject to change as new information becomes available. Procedures for documenting changes are identified in FSH 2609.25 section 1.32.)

Federally listed as Endangered (E), Threatened (T), or Proposed (P)

<u>Species</u>	<u>Code</u>
* <i>Arabis macdonaldiana</i> Eastw. (E)	ARMA33
***+ <i>Astragalus applegatei</i> Peck (E)	ASAP
***+ <i>Fritillaria gentneri</i> Gilkey (E)	FRGE
<i>Phlox hirsuta</i> E.Nelson (E)	PHHI7

Region 5 listed as Sensitive that may occur on the Klamath National Forest

<u>Vascular Plant Species</u>	<u>Code</u>
+ <i>Botrychium crenulatum</i> W. H. Wagner	BOCR
+ <i>Botrychium lunaria</i> (L.) Sw.	BOLU
+ <i>Botrychium minganense</i> Victorin	BOMI
+ <i>Botrychium montanum</i> W. H. Wagner	BOMO
H <i>Botrychium pinnatum</i> St. John	BOPI
+ <i>Botrychium pumicola</i> Coville ex Underw	BOPU2
<i>Calochortus greenei</i> Wats.	CAGR
** <i>Calochortus persistens</i> Ownbey	CAPE
<i>Campanula wilkinsiana</i> Greene	CAWI8
<i>Chaenactis suffrutescens</i> A. Gray	CHSU
<i>Cypripedium fasciculatum</i> Wats.	CYFA
<i>Cypripedium montanum</i> Lindl.	CYMO2
<i>Draba carnosula</i> O. E. Schulz	DRCA6
<i>Epilobium oreganum</i> Greene	EPOR
<i>Eriogonum alpinum</i> Engelm.	ERAL6
<i>Eriogonum hirtellum</i> J.T. Howell and Bacig.	ERHI7
<i>Eriogonum ursinum</i> S. Watson var. <i>erubescens</i> Reveal	ERURE
<i>Erythronium hendersonii</i> S. Watson	ERHE7
+ <i>Eucephalis vialis</i> Bradshaw	EUVI8
+ <i>Frasera umpquaensis</i> M.E. Peck & Applegate	FRUM2
<i>Horkelia hendersonii</i> J. Howell	HOHE2
<i>Ivesia pickeringii</i> Torr. ex Gray	IVPI
<i>Lupinus lepidus</i> Dougl. ex Lindl. var. <i>ashlandensis</i> (B.J.Cox) Isley	LULEA
H <i>Mimulus evanescens</i> Meinke	MIEV
<i>Minuartia stolonifera</i> Nelson & Nelson	MIST9
<i>Parnassia cirrata</i> Piper var. <i>intermedia</i> P.K.	PACII
<i>Pedicularis howellii</i> Gray	PEHO
<i>Phacelia cookei</i> Const. & Heckard	PHCO20
<i>Phacelia greenei</i> J. Howell	PHGR2

<i>Phacelia inundata</i> J. Howell	PHIN3
<i>Pinus albicaulis</i> Engelm.	PIAL
+ <i>Polemonium chartaceum</i> H. Mason	POCH3
<i>Raillardella pringlei</i> Greene	RAPR
<i>Rorippa columbiae</i> (Robinson) Howell	ROCO3
<i>Tauschia howellii</i> (Coult. & Rose) Macbr.	TAHO2
<i>Thermopsis robusta</i> J. Howell	THRO4

Fungi Species	Code
<i>Boletus pulcherrimus</i> Thiers & Halling	BOPU4
<i>Cudonia monticola</i> Mains	CUMO2
<i>Dendrocollybia racemosa</i> (pers.: Fr.) Peterson & Redhead	DERA5
<i>Phaeocollybia olivacea</i> A.H.Smith	PHOL
<i>Tricholomopsis fulvescens</i> A.H.Smith	TRFU3

Region 5 listed as Sensitive that may occur on the Klamath National Forest

Bryophyte Species	Code
+ <i>Buxbaumia viridis</i> (DC.) Moug. & Nestl.	BUVI2
<i>Fissidens aphelotaxifolius</i> Pursell	FIAP
<i>Helodium blandowii</i> (Web. & Mohr) Warnst.	HEBL2
<i>Meesia uliginosa</i> Hedw	MEUL70
<i>Mielichhoferia elongata</i> (Hoppe & Hornsch. Ex Hook)	MIEL5

Lichen Species	Code
+ <i>Peltigera gowardii</i> Lendemer & H.O'Brien	PEGO4

- * Listed as Endangered by the State of California.
- ** Listed as Rare by the State of California.
- *** Listed as Endangered by the State of Oregon
- C Listed as Federal Candidate species
- + Suspected to occur, not currently documented.
- H Historic occurrence, not currently documented

Appendix B– Klamath National Forest Noxious Weed List

Scientific Name (Jepson, 1993)	Plants Code	Common Name(s)	KNF Priority	CDFA Rating	Cal-IPC Rating	Family
<i>Acroptilon repens</i> (L.) DC.	ACRE3	Russian knapweed	High	B	Moderate	Asteraceae
<i>Ailanthus altissima</i>	AIAL	Tree of Heaven	Mod.	C	Moderate	Simaroubaceae
<i>Bromus tectorum</i> L.	BRTE	Cheat Grass	Low	None	High	Poaceae
<i>Buddleja davidii</i> Franchet	BUDA2	Butterfly bush	Mod.	None	None	Buddlejaceae
<i>Cardaria draba</i> (L.) Desv.	CADR	Heart-podded hoary cress Whitetop	Mod.	B	Moderate	Brassicaceae
<i>Cardaria chalapensis</i> (L.) Hand.-Maz	CACH10	Lens-podded Whitetop	Mod.	B	Moderate ♦	Brassicaceae
<i>Carduus nutans</i> L.	CANU4	Musk thistle	High	A	Moderate	Asteraceae
<i>Carduus pycnocephalus</i> L.	CAPY2	Italian thistle Plumeless Italian thistle	High	C	Moderate	Asteraceae
<i>Centaurea diffusa</i> Lam.	CEDI3	Diffuse knapweed, white knapweed	High	A	Moderate	Asteraceae
<i>Centaurea maculosa</i> Lam.	CEMA4	Spotted knapweed	High	A	High	Asteraceae
<i>Centaurea debeauxii</i> Gren. & Godr.	CEDE5 CEPR2	Meadow knapweed	High	A	Moderate ♦	Asteraceae
<i>Centaurea solstitialis</i> L.	CESO3	Yellow starthistle	Mod.	C	High	Asteraceae
<i>Centaurea squarrosa</i> Willd.	CESQ	Squarrose knapweed	High	A	Moderate	Asteraceae
<i>Chondrilla juncea</i> L.	CHJU	Rush skeleton weed, hogbite	High	A	Moderate	Asteraceae
<i>Cirsium arvense</i> (L.) Scop.	CIAR4	Canada thistle	Mod.	B	Moderate	Asteraceae
<i>Cirsium vulgare</i>	CIVU	Bull thistle	Low	C	Moderate	Asteraceae
<i>Conium maculatum</i> L.	COMA2	Poison hemlock	Low	None	Moderate	Apiaceae
<i>Cynoglossum officinale</i> L.	CYOF	Houndstongue	High	None	Moderate	Boraginaceae
<i>Cytisus scoparius</i> (L.) Link.	CYSC4	Scotch Broom	High	C	High	Fabaceae
<i>Euphorbia esula</i> L.	EUES	Leafy spurge	High	A	High ♦	Euphorbiaceae
<i>Euphorbia oblongata</i> Grisb.	EUOB4	Oblong spurge	High	B	Limited	Euphorbiaceae
<i>Foeniculum vulgare</i> Mill.	FOVU4	Fennel	High	None	High	Apiaceae

Scientific Name (Jepson, 1993)	Plants Code	Common Name(s)	KNF Priority	CDFA Rating	Cal-IPC Rating	Family
<i>Genista monspessulana</i> (L.) L. Johnson	GEMO2	French broom	High	C	High	Fabaceae
<i>Hypericum perforatum</i> L.	HYPE	Klamath weed, St. John's wort	Low	C	Moderate	Hypericaceae
<i>Isatis tinctoria</i> L.	ISTI	Dyer's woad, Marlahan mustard	Mod.	B	Moderate	Brassicaceae
<i>Lathyrus latifolius</i> L.	LALA4	Sweet pea	Low	None	None	Fabaceae
<i>Lepidium latifolium</i> L.	LELA2	Perennial Pepperweed, tall whitetop	High	B	High	Brassicaceae
<i>Linaria dalmatica</i> (L.) P. Mill ssp. <i>Dalmatica</i>	LIDAD	Dalmation toadflax	High	A	Moderate	Schropulariaceae
<i>Lythrum salicaria</i> L.	LYSA2	Purple Loosestrife	High	B	High	Lythraceae
<i>Melilotus</i> spp.	MEAL2, MEOF	White Sweetclover, Yellow Sweetclover	Low	None	None	Fabaceae
<i>Onopordum acanthium</i> L.	ONAC	Scotch thistle, Cottonthistle	High	A	High	Asteraceae
<i>Onopordum tauricum</i> Willd.	ONTA	Taurian thistle, Bull cottonthistle	High	A	None	Asteraceae
<i>Polygonum cuspidatum</i> Sieb. & Zucc.	POCU6	Japanese knotweed	High	B	Moderate ♦	Polygonaceae
<i>Potentilla recta</i> L.	PORE5	Sulphur cinquefoil	High	None	None	Rosaceae
<i>Rubus discolor</i>	RUDI2	Himalayan blackberry	Low	None	None	Rosaceae
<i>Salvia aethiopis</i> L.	SAAE	Mediterranean sage	High	B	Limited	Lamiaceae
<i>Sonchus arvensis</i>	SOAR2	Perennial Sowthistle, Field Sow-thistle	High	A	None	Asteraceae
<i>Spartium junceum</i>	SPJU2	Spanish Broom	High	C	High	Fabaceae
<i>Taeniatherum caputmedusae</i>	TACA8	Medusahead	Low	C	High	Poaceae
<i>Tamarix parviflora</i>	TAPA4	Tamarisk	High	B	High	Tamaricaceae
<i>Tribulus terrestris</i>	TRTE	Puncture vine	High	C	None	Zygophyllaceae

Pest Ratings:

Klamath National Forest (KNF) Priority:

High: These species are currently either limited in distribution, highly invasive, or not present on the KNF. Treatment may vary by location.

Moderate: These species are generally common, and are treated on a case by case basis depending on location (Wilderness and Research Natural Area (RNA) increase the priority for treatment).

Low: These species are either widespread throughout the KNF, or are not considered to be highly invasive in our area. Usually not treated unless located in a high priority area, such as Wilderness or RNA.

California Dept. of Food and Agriculture (CDFA):

A: Eradication, containment, rejection, or other holding action at State-County level. Quarantine interceptions to be rejected or treated at any point in the State.

B: Species more widespread. Eradication, containment, control, or other holding action at the discretion of the County Ag. Commissioner.

C: Species very widespread. State endorsed holding action and eradication only when found in a nursery; action to retard spread outside of nurseries at the discretion of the commissioner; reject only when found in a crop seed for planting or at the discretion of the County Ag. Commissioner.

Q: Temporary "A" action outside of nurseries at the state-county level pending determination of a permanent rating. Species on List 2, "Federal Noxious Weed Regulation" are given an automatic "Q" rating when evaluated in California.

California Invasive Plant Council (Cal-IPC):

High: These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate: These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited: These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic. ♦

= Alert References:

California Department of Food and Ag; Pest Ratings of Noxious Weed Species, 2004. from Website:

<http://www.cdfa.ca.gov/phpps/ipc/weedinfo/wininfo_pestrating_2009.pdf>

Cal-IPC; California Invasive Plant Inventory, February, 2006. From Website: <<http://www.cal-ipc.org/ip/inventory/pdf/Inventory2006.pdf>>

Plants Database, USDA NRCS. Invasive and Noxious Weeds., December, 2009. From Website:

<<http://plants.usda.gov/java/noxious?rptType=State&statefips=06>>

The Jepson Manual, 1993; University of California Press, James Hickman, Editor

USDA, Forest Service. National Strategy and Implementation Plan for Invasive Species Management. FS-805, October 2004.

Species	Category	Type
Known to occur in project area (Pre-disturbance Survey Required for Category A & C, Protect Known Sites for Category B, D, and E)		
<i>Cypripedium montanum</i>	S&M – C (also FS Sensitive)	Plant
<i>Ptilidium californicum</i>	S&M – A	Bryophyte
<i>Clavariadelphus truncatus</i>	S&M – D	Fungi
<i>Cortinarius olympianus</i>	S&M – B	Fungi

<i>Turbinellus floccosus</i>	S&M – F	Fungi
Pre-disturbance Surveys Required (Suitable Habitat Present and w/in Range)		
<i>Cypripedium fasciculatum</i>	S&M – C (also FS Sensitive)	Plant
<i>Tetraphis geniculata</i>	S&M – A	Bryophyte
<i>Leptogium cyanescens</i>	S&M – A	Lichen
<i>Lobaria oregana</i>	S&M – A	Lichen
<i>Cladonia norvegica</i>	S&M – C	Lichen

